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RAIL AND MOTOR OUTLOADING CAPABILITY STUDY, CAMP SHELBY, MISSIS--ETC(U)
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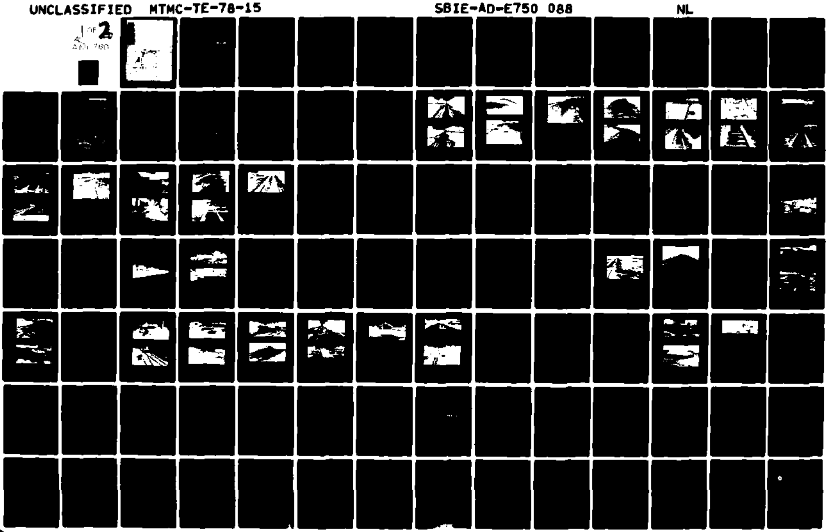

MTMC REPORT TE 78-15

RAIL AND MOTOR OUTLOADING CAPABILITY STUDY

CAMP SHELBY, MISSISSIPPI

May 1978

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Newport News, Virginia 23606

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EXECUTIVE SUMMARY

1. SCOPE

The Military Traffic Management Command (MTMC) conducted a field survey of the rail and motor facilities at Camp Shelby, Mississippi from 12 through 16 December 1977, to determine the installation's capability to outload three brigades. Rail facilities within 25 miles of Camp Shelby were included in the survey.

2. FINDINGS

The primary finding is that Camp Shelby has a potential capability to support only relatively small-scale rail outloading operations; however, if trackage in the vicinity belonging to the Illinois Central Gulf (ICG) Railroad and the Southern Railroad (SR) is used, the potential outloading capability for roadable equipment is large scale. Camp Shelby is serviced by the ICG with a main line track running through the west section of the installation property. The railroad tracks at Camp Shelby are in fair condition, requiring maintenance.

The supply of blocking and bracing materials, bridgeplates and small handtools on hand is inadequate for outloading operations. Also, outloading plans have not been developed. If sufficient blocking and bracing materials and small handtools were available, the current capability, using existing Camp Shelby facilities in fair condition, would be 36 railcars per day and the daily mobilize capability would be 89 railcars per day for nonroadable equipment.

The recommended plan, Plan 1, yields an outloading rate of 110 railcars and outloads the nonroadable equipment is 6.1 days (table 1). Since Camp Shelby is close to four ports of embarkation (POE), the roadable equipment can be driven to the POE.

The typical railcar length used in this report is 57 feet (coupler to coupler).[1/]

1/ Conversion to any other length car is accomplished simply by multiplying the length being used by the number of cars and dividing by the desired length.

TABLE 1
RAIL AND MOTOR OUTLOADING CAPABILITY

Rail				
Rate	Number of Cars			Current Constraints
	Total	Flats	Box	
Daily Current	36			Outloading plans, damaged end ramp, and lack of blocking and bracing materials, bridge plates, and small handtools.
Daily Mobilize	89[a/]	59	30	Outloading plans, lack of blocking and bracing materials, bridge-plates, and small handtools.
Plan 1	110[b/]	80	30	Same, plus one permanent end-loading ramp and track rehabilitation ($19,225).

Motor		
Daily Current	62	Only 55 flatbeds owned in area, 8 of which are lowboys, capable of moving heavy tracked vehicles.
Daily Mobilize	400	

[a/] Nonroadable equipment, can be increased to 333 railcars by employing the ICG and the SR yards at Hattiesburg, Mississippi; thus, roadable equipment could also be outloaded by rail.

[b/] Recommended plan - outloads the three brigades' nonroadable equipment in 6.1 days. Ninety of the 92 boxcars will be outloaded during the first 3 days, and the flats and remaining 2 boxcars will be outloaded the last 3.1 days.

Three National Guard armored brigades are to be mobilized here. To transport the nonroadable equipment, 673 railcars would be required, with an estimated composition of 561 57-foot flats, 20 80-ton flats, and 92 boxcars. Since no time frame has been established for outloading the unit, the analysis is based on an outloading period of 6 days. Other options producing 126, 151, and 204 railcars per day are

presented in this report. By using most of the commercial ICG and SR facilities, a rate of 333 railcars per day is possible. Railroad representatives assisted in determining the extent and capability of facilities within 25 miles of Camp Shelby.

A survey of end-loading ramps and other equipment suitable for semi-trailer loading revealed that the motor outloading capability of the facilities and equipment far exceeds the probable supply of available commercial equipment (table 1). The actual availability cannot be readily determined.

3. CONCLUSIONS

a. The condition of the three spur tracks at Camp Shelby is fair, maintenance required. Current rail outloading capability is limited by lack of necessary supporting elements, such as outloading plans, blocking and bracing materials, and small handtools.

b. Because Camp Shelby is only 74 miles from Gulfport, Mississippi, only nonroadable equipment would have to be outloaded by rail. Necessary supplies should be stocked accordingly.

c. Estimated minimal cost for track rehabilitation and ramp construction to achieve an outloading rate of 110 railcars per 24-hour day is $19,225. Cost for needed blocking and bracing materials and small handtools is additional. After the noted deficiencies are corrected and on receipt of sufficient railcars to permit full-scale outloading operations, the three brigades' nonroadable equipment could be outloaded in 6 days.

d. Empty cars (dedicated train lengths) destined for Camp Shelby should be positioned, as in train-loading sequence, at Hattiesburg.

e. The ICG spur at Camp Shelby will be needed for a mobilization move; currently, this track needs maintenance.

f. Camp Shelby transportation personnel should coordinate planning of impending outloading operations with the ICG representatives at the earliest possible date.

g. For administrative-type moves, when leadtime is plentiful and costs must be considered, special-purpose railcars (such as bi-level autoracks, trailer-on-flatcar (TOFC), and container-on-flatcar (COFC) cars) are more cost-effective than the standard types and should be used to the extent they are available.

h. For mobilization moves, when time is more critical than costs, the use of special-purpose railcars may not be possible because of the short leadtime and relatively short supply of these high-demand cars.

i. Motor outloading facilities for loading commercial flatbed semitrailers and vans, which can accommodate 400 semitrailer loads during daylight hours for separate operations, far exceed the likely available supply of trailers.

j. Since Camp Shelby is about 74 miles from Gulfport, semitrailer outloading is a significant consideration because a commercial tractor-trailer could make the round trip in about 4 hours.

4. RECOMMENDATIONS

a. Undertake those items listed in section II, paragraph D4, "Physical Improvements and Additions." These improvements will provide a rail system capability of 110 railcars per 24-hour day.

b. Prepare a detailed unit outloading plan, using the simulation in appendix B as an example, that specifies unit assignments at loadout sites and movement functions.

c. Coordinate rail outloading plans with the ICG representative at the earliest possible date.

d. Provide rail facility maintenance to insure an effective rail system.

e. Provide advance training for blocking and bracing crews.

f. Station road guards at all railroad crossings during outloading operations to insure a safer and more efficient operation.

g. Keep abreast of the ICG plans for the spur at Camp Shelby and the siding at MacLaurin, as these tracks are needed for the support of major outloading operations for nonroadable equipment.

h. Use special-purpose railcars (such as bilevel autoracks for small vehicles and TOFC cars for semitrailers and vans) for administrative-type moves and, as available, for mobilization moves.

I. INTRODUCTION

An onsite rail and motor outloading study of Camp Shelby, Mississippi, was conducted by the Military Traffic Management Command Transportation Engineering Agency, Newport News, Virginia, from 12 through 16 December 1977. This report covers the rail outloading phase of the deployment. The principal objective of the study was to determine Camp Shelby's capability to support the deployment of units to be mobilized there. Another objective was to identify any physical improvements that could significantly increase present capabilities, as well as any suitable commercial facilities within 25 miles of Camp Shelby. The main entrance to Camp Shelby is on US Highway 49, approximately 12 miles south of Hattiesburg, Mississippi (fig 1).

The major finding of the survey and the ensuing analysis is that the existing rail trackage and facilities will support a maximum outloading rate of approximately 89 railcars (daily mobilize) per 24-hour day, which would outload the nonroadable equipment in 7. 3 days. However, Camp Shelby's outloading capabilities are restricted by lack of outloading plans, blocking and bracing materials, and other necessary elements. Physical improvements, such as the spur funded for FY 78, end-ramp construction, along with other necessary elements, could establish an outloading capability of up to 110 railcar loads of nonroadable equipment per 24-hour day. Several commercial rail facilities within 25 miles of Camp Shelby are suitable for outloading roadable equipment, but since Camp Shelby is close to four POEs, this equipment could be driven to the port.

Findings and recommendations contained in this report are based on analysis of data obtained during the field study and other pertinent information relating to installation activities at that time. Any problems incurred in implementing the recommendations should be referred to MTMC for resolution.

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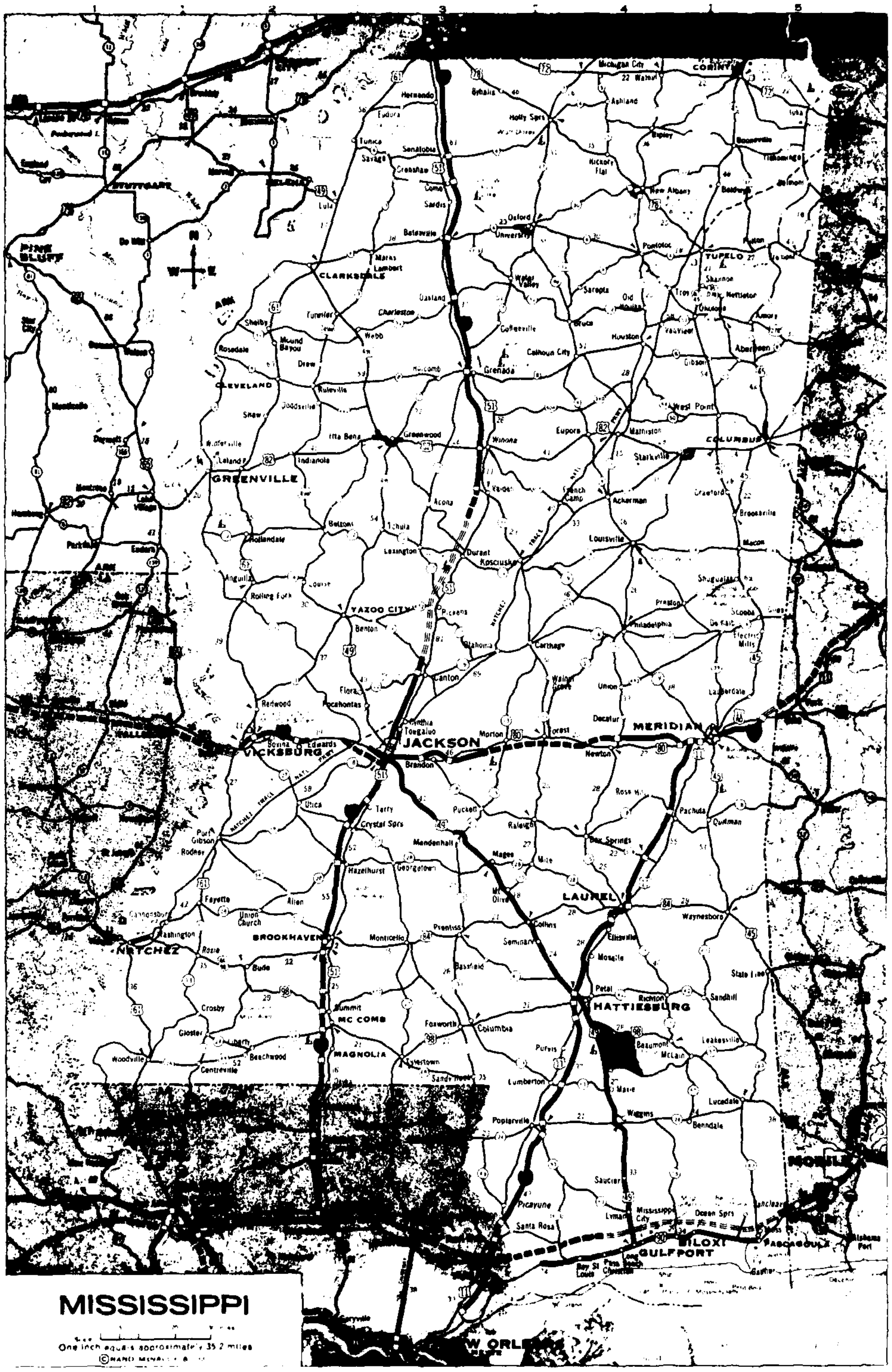


Figure 1. Camp Shelby and vicinity.

II. ANALYSIS OF CAMP SHELBY'S RAIL OUTLOADING FACILITIES

A. GENERAL

Discussions with staff personnel at Camp Shelby and meetings with officials of the ICG and SR concerning rail outloading revealed that large-scale rail operations have not occurred at the post in recent years. The post has concentrated on basic training activities, which by their nature, require little ability to move organized units. Factual data about locomotive operating times and blocking and bracing capabilities were gathered from other studies.

Throughout this report the following terms are used to describe track condition: good - requires no immediate maintenance; fair - usable, but requires maintenance; poor - unusable requires major maintenance.

B. RAIL FACILITY DESCRIPTION

The Camp Shelby rail system is illustrated in figure 2 and described in table 2. The survey of all sites that could be used for outloading equipment revealed that only two sites currently are usable for end-loading vehicles and that one other site has potential, but currently is not usable since the end ramp has been damaged severely and it would have to be replaced.

Two tracks owned by the ICG, tracks L2 and L1, are included in the analysis of Camp Shelby facilities. Track L2 is within the boundaries of Camp Shelby and track L1 abuts Camp Shelby's west side at McLaurin; both tracks are needed for the recommended outloading plan.

Track L1, a siding, is fewer than 3 miles from the tracked vehicle park and can be used for outloading nonroadable equipment. Since the siding is on the west side of the main track, it will be necessary to place several truckloads of gravel on the track to provide access. Also, a portable ramp will be needed. The ramp could be an end section from a portable bridge span. This track is in fair condition, and a staging area with a 30-flatcar capacity is at the north end of the siding (figs 3, 4, and 5).

The Camp Shelby ICG center spur, L2, is in fair condition. A portable ramp will be required; a section of a portable bridge span would be suitable. This spur has a 9-flatcar capacity (figs 6 and 7).

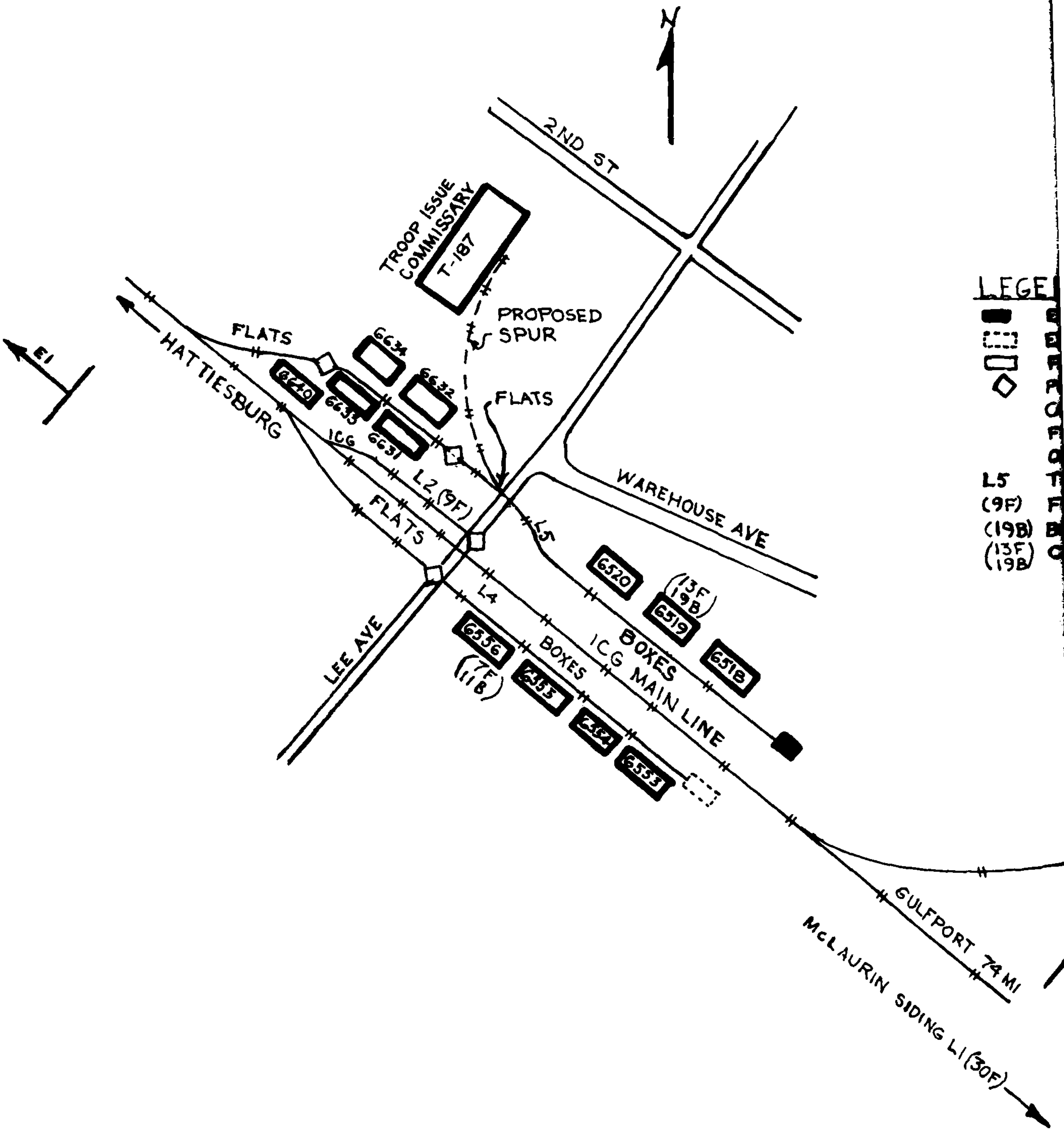


Figure 2. Camp Shelby rail system.

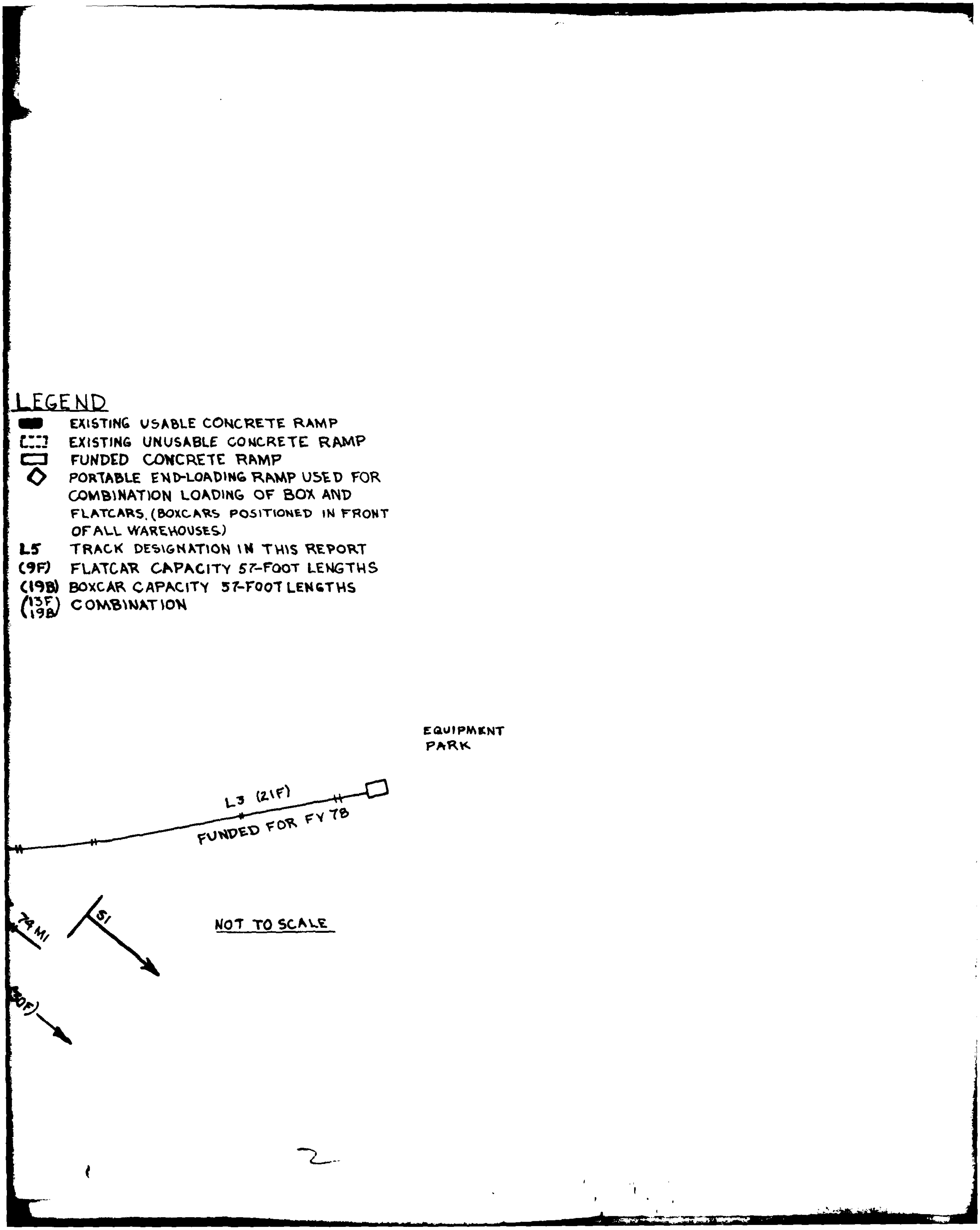

LEGEND
EXISTING USABLE CONCRETE RAMP
EXISTING UNUSABLE CONCRETE RAMP
FUNDED CONCRETE RAMP
PORTABLE END-LOADING RAMP USED FOR COMBINATION LOADING OF BOX AND FLATCARS. (BOXCARS POSITIONED IN FRONT OF ALL WAREHOUSES)
L5 TRACK DESIGNATION IN THIS REPORT
(9F) FLATCAR CAPACITY 57-FOOT LENGTHS
(19B) BOXCAR CAPACITY 57-FOOT LENGTHS
(13F 19B) COMBINATION
EQUIPMENT PARK
L3 (21F)
FUNDED FOR FY 78
74 MI
51
NOT TO SCALE
2

TABLE 2
CAMP SHELBY RAIL OUTLOADING FACILITIES

Track and Figure Number	End Ramp	Lighting	Surface Conditions	Staging Area	Railcar Capacity (57-Foot Lengths)	Access Availability	Present Condition of Track
McLaurin siding (ICG), L1 Figs 3, 4, and 5	No. End loading with portable ramp at north end of siding.	No	Natural ground	Along road, and north end of siding has a staging area.	30	By road adjacent to siding that connects with Camp Shelby's equipment area, approximately 3 miles distant, siding is on west side of main line and will require gravel over main line to clear rail.	Fair
Camp Shelby center spur owned by ICG from Lee Blvd north, L2 Figs 6 and 7	No	No	Gravel and paved	Yes, adjacent to track	9	Good	Fair. Poor drainage, missing spikes and joint bars, some rail heavily corroded, bed needs ballast and to be raised

TABLE 2 - cont

Track and Figure Number	End Ramp	Lighting	Surface Conditions	Staging Area	Railcar Capacity (57-Foot Lengths)	Access Availability	Present Condition of Track
Camp Shelby L3 (funded for FY 78, extending from ICG main line to equipment park area) Figs 8 and 9	Yes, concrete. Funded FY 78	No	Good	Yes. Good, equipment park serves as a staging area	21	Good	N/A. Track bed has been rough graded
Camp Shelby west spur, L4 (180 ft of north end belongs to ICG) Figs 10, 11, 12, and 13	Yes, damaged	Yes. over warehouse doors	Gravel	Yes	21 flatcars or combination, 11 boxcars and 7 flatcars	Good	Fair. Poor drainage, bed needs ballast and raising, some bad ties
Camp Shelby east spur, L5, Figs 14, 15, 16, 17, and 18	Yes, concrete	Yes, at warehouse doors	Gravel	Yes, between motor pool buildings	37 flatcars or 19 boxcars and 13 flatcars	Good	Fair to good. Needs drainage and weed control, fair at north end, ties covered with soil, some bad ties
Camp Shelby proposed spur, off of the east spur (L5) to site between commissary and Bldg 102. Figs 19, 20, and 21	No, but concrete retaining wall to onload; also side loading from concrete platform at commissary warehouse, 2 boxcar positions	Yes, along warehouse dock	Will have to grade and pave the area leading from 2nd Street to the end of the track	Small and 2nd Street	16	Good	N/A, proposed new construction

Figure 3. L1, McLaurin siding (looking south).

Figure 4. L1, McLaurin siding (looking north).

Figure 5. Portable bridge spans. (End sections can be blocked up and used for temporary ramps.)

Figure 6. ICG spur L2. (This spur needs maintenance badly. The crossties will soon rot if drainage and weeds are not controlled.)

Figure 7. ICG spur L2, north end, overgrown with weeds.

The spur, L3, that will serve the equipment park is funded for FY 78. It will have a concrete end-loading ramp and a 20-flatcar capacity (figs 8 and 9).

The west spur, L4, is in fair condition, but the end ramp has been severely damaged and needs to be replaced (fig 10). A combination of 11 boxcars and 7 flatcars could be loaded simultaneously on this track, the flatcars on the north end by a portable ramp. However, if the damaged end ramp were replaced, 21 flatcars could be loaded here. Drainage should be improved to prevent tie deterioration (figs 11, 12, and 13).

The east spur, L5, is in good to fair condition and has a concrete end-loading ramp. A combination of 19 boxcars and 13 flatcars could be loaded simultaneously by using two portable end ramps, one placed near the south end of Building 6631 for loading in a southerly direction and the other placed near the south end of Building 6640 for loading in a northerly direction, or 37 flatcars could be loaded using the end ramp (figs 14 through 18).

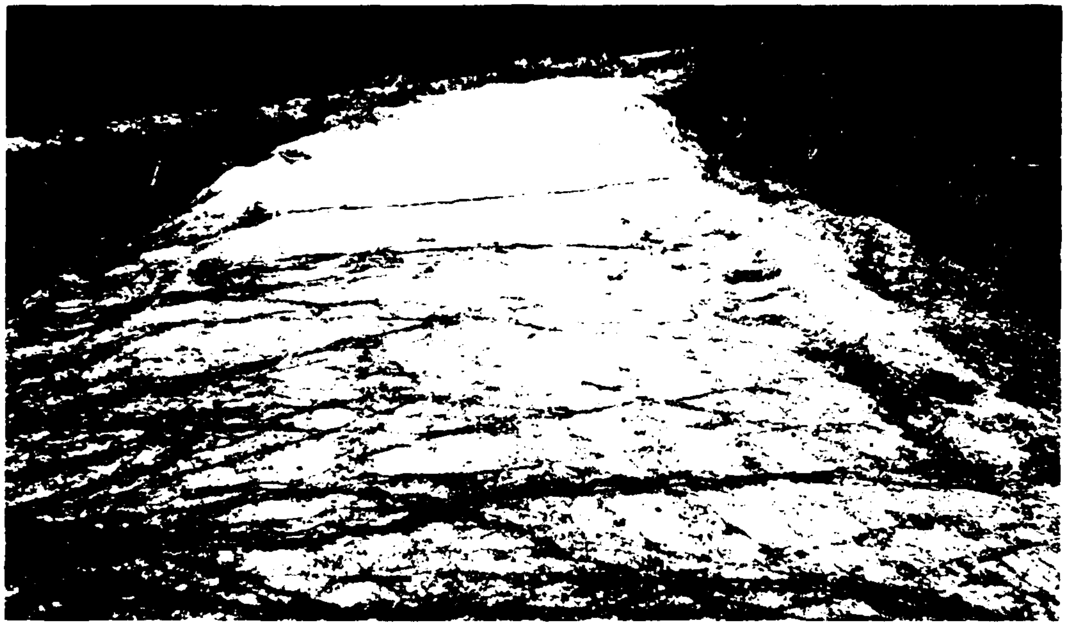


Figure 8. L3, embankment for funded spur at north end.

Figure 9. L3, embankment for funded spur. (Equipment park at upper left.)

Figure 10. L4, west spur end ramp. (Damaged end ramp should be replaced.)

Figure 11. L4, west spur (looking north from the ramp).

Figure 12. L4, west spur near north end. (Poor drainage will soon cause the crossties to rot.)

Figure 13. ICG main line at switch to L4. (Mud pumping up between the ties.)

Figure 14. L5, east spur (looking north from ramp).

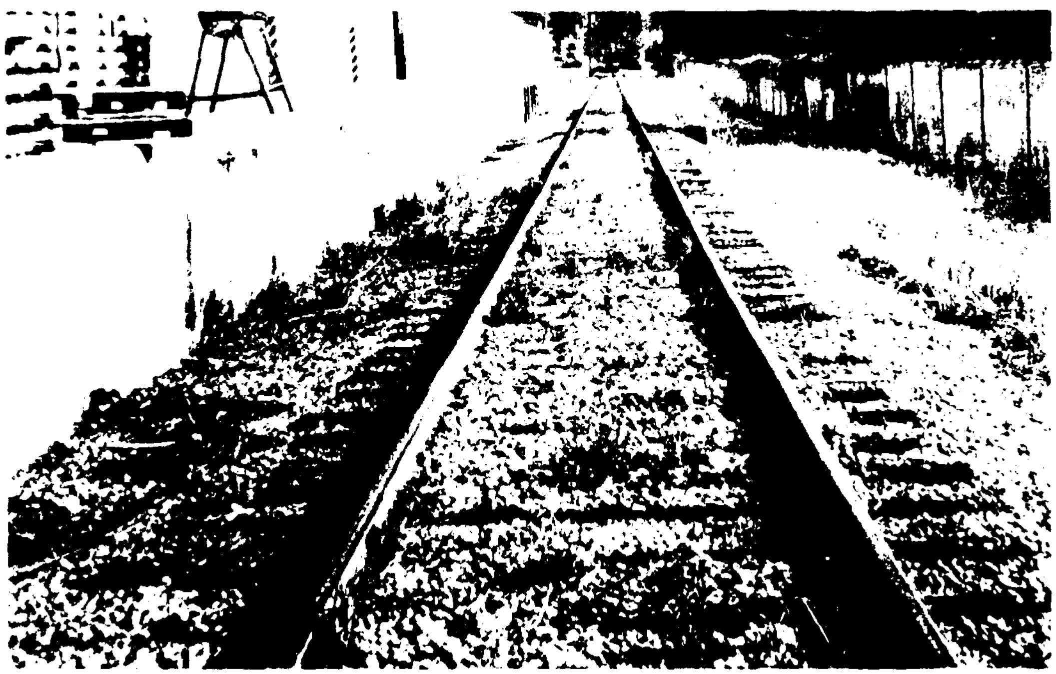


Figure 15. L5, east spur (looking south from Building 6520 along warehouses continuous side-loading dock).

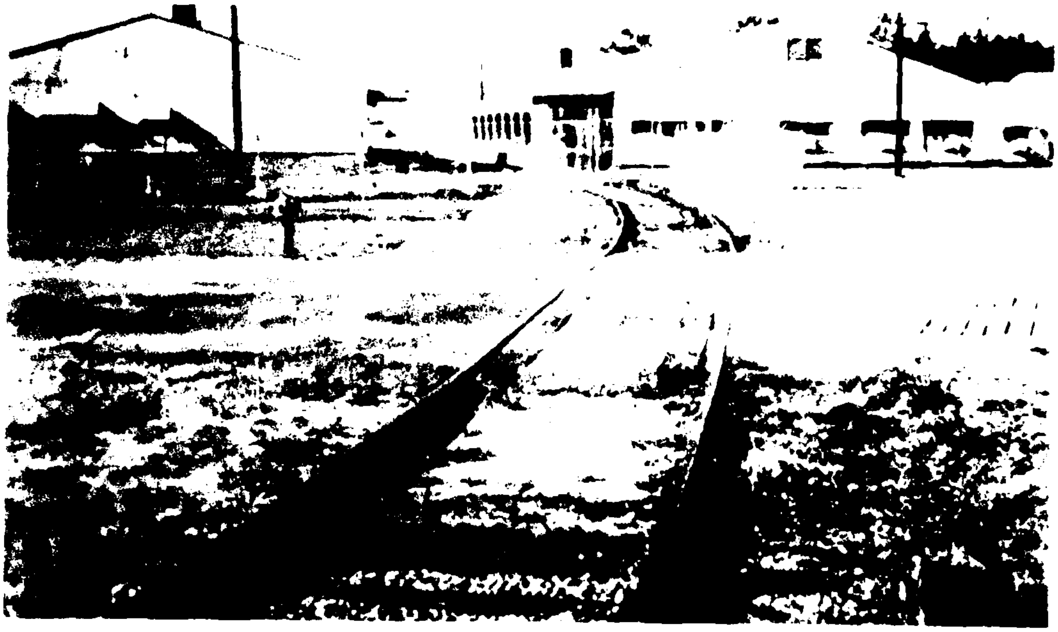


Figure 16. L5, east spur (looking north from Building 6520 across Lee Boulevard).

Figure 17. L5, east spur side-loading docks along warehouses 6631 to 6634.

Figure 18. L5, east spur at north end near switch at ICG main line. (Note poor drainage.)

The proposed spur that would serve the commissary, could be used for loading 16 flatcars (figs 19, 20, and 21).

The ICG main line traverses northwest/southeast through the west side of Camp Shelby and is in fair to good condition (figs 22 and 23). All of the spurs connect directly to the main line except the proposed spur, which would be connected to the Camp Shelby east spur.

Access to Camp Shelby's rail system is good. Vehicles from motor pools and equipment from storage areas can be routed along good asphalt roads to any of the loadout sites. This fact, coupled with the potential of the rail system, indicates that Camp Shelby can develop sufficient capability to successfully outload the nonroadable equipment within an acceptable time frame.

Figure 19. Proposed spur to commissary. (This spur would cross paved area and graveled drive. Commissary at upper center.)

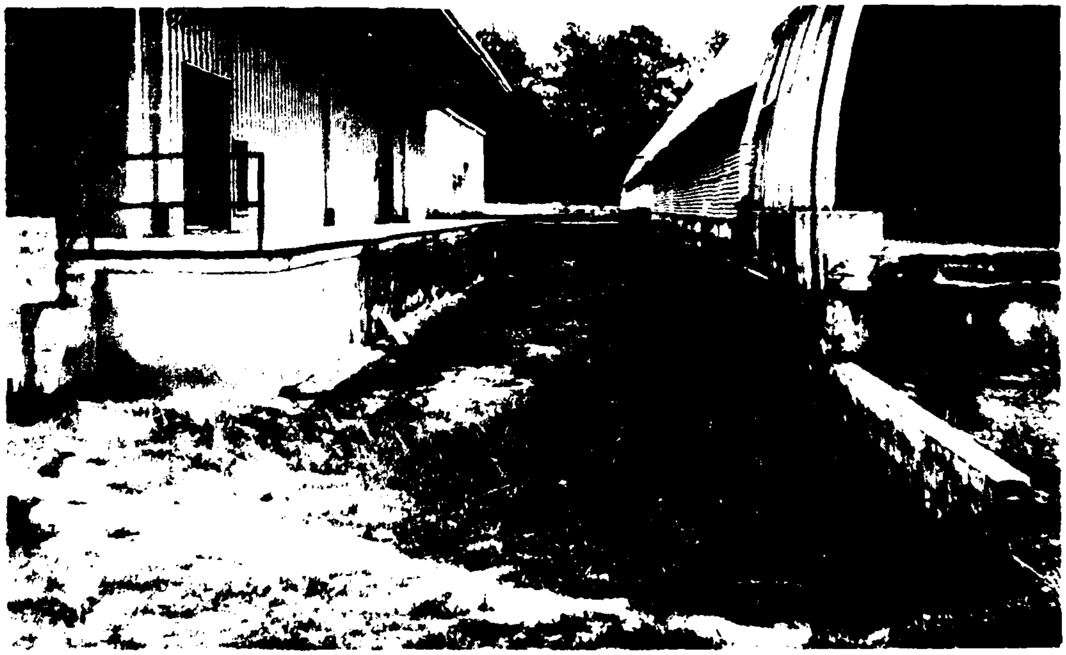


Figure 20. Proposed spur. (This spur would terminate at concrete retaining wall (center of figure) and would provide two boxcar positions.)

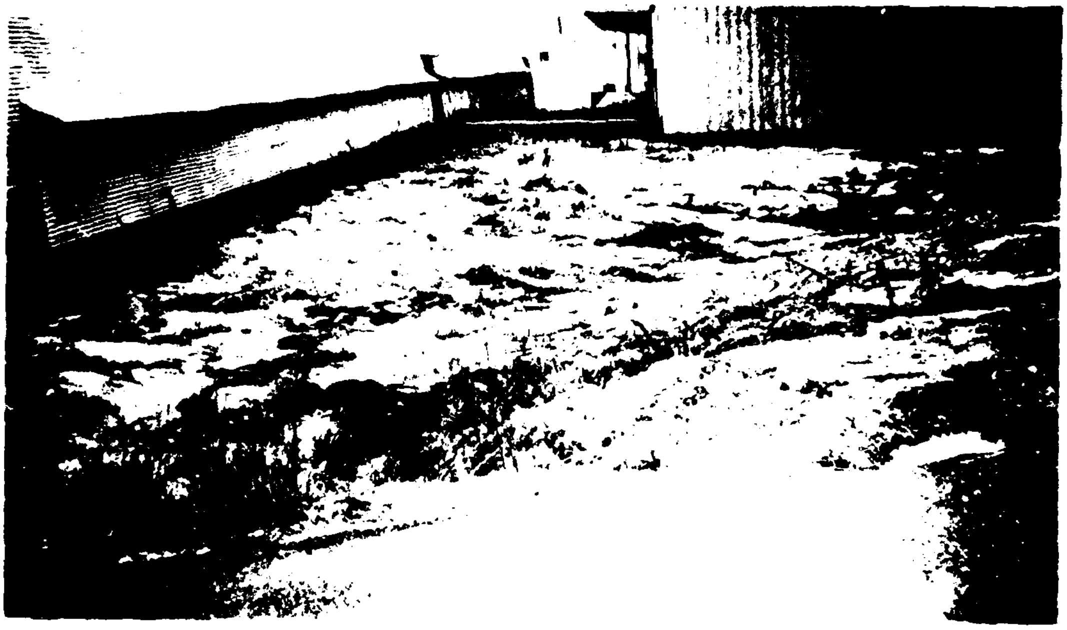


Figure 21. Proposed spur end-loading, from 2nd Street (bottom of figure).

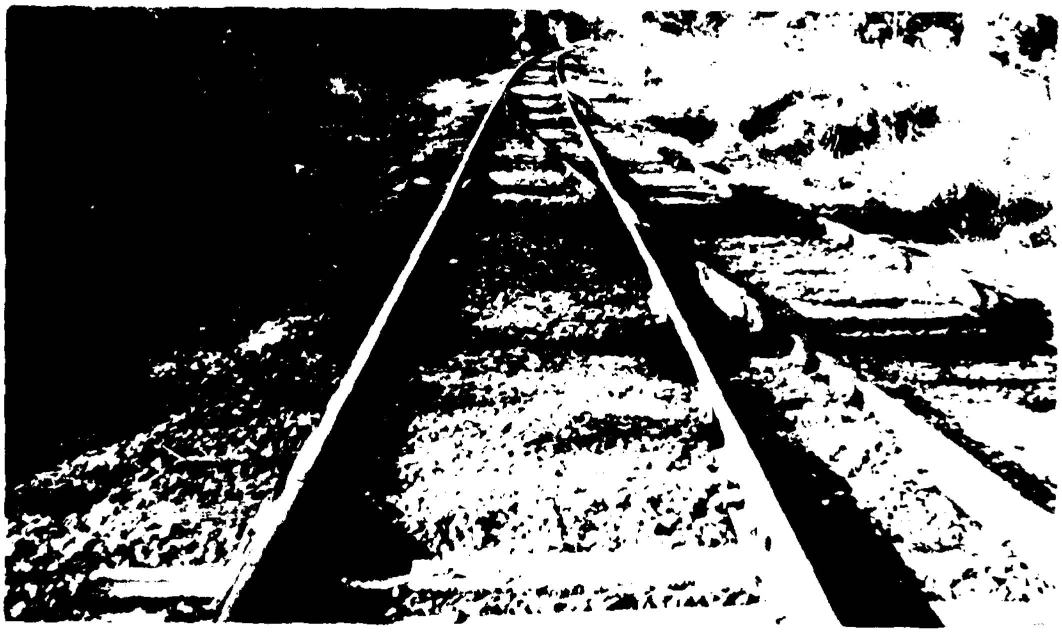


Figure 22. ICG main line (looking north from switch at L5).

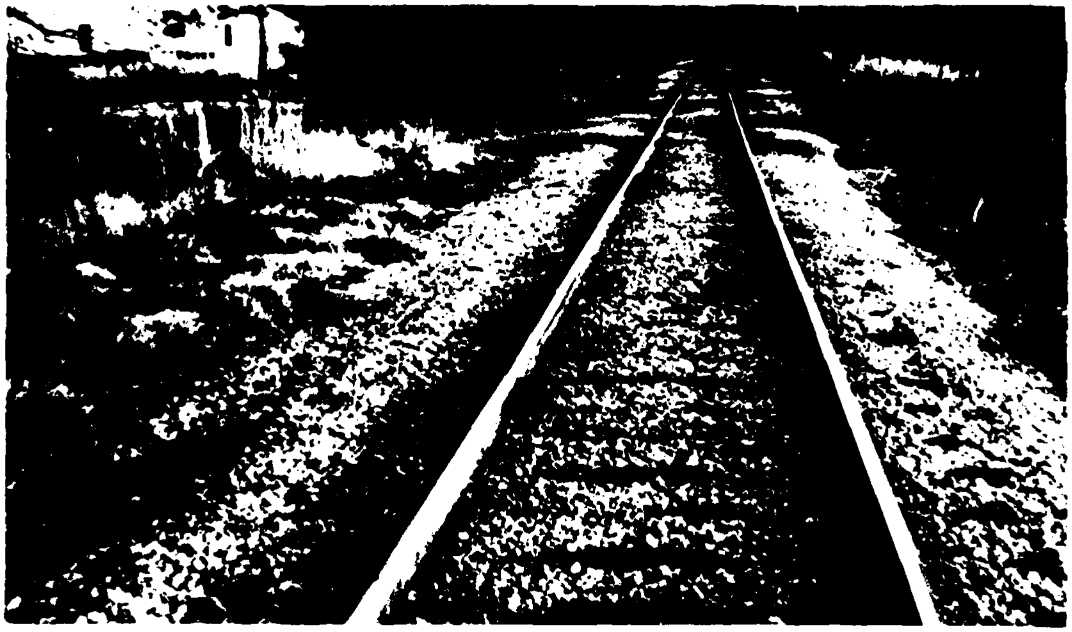


Figure 23. ICG main line (looking south from Lee Boulevard).

C. CURRENT PROCEDURES

The Illinois Central Gulf (ICG) railroad serves Camp Shelby. A main line runs through the installation, and pickup and delivery of railcars is performed by the ICG. Most incoming supplies are delivered by truck; however, all heavy nonroadable equipment is delivered by rail and off-loaded at track L5 ramp. Outloading plans have not been developed, blocking and bracing materials are not stocked, and handtools and bridgeplates are not sufficient. Preparations for outloading the nonroadable equipment should be pursued until acceptable plans and arrangements have been completed.

D. RAIL SYSTEM ANALYSIS

1. Current Outloading Capability

Camp Shelby's rail system current capability is less than the potential capability, due primarily to a damaged end-loading ramp and lack of one spur, which is funded for FY 78. Detailed systems analyses have shown that, in order to realize a high outloading rate, the ICG spur at Camp Shelby and the siding at MacLaurin must be used as an integral part of the operation. Some portions of these tracks need maintenance, as previously

mentioned. Post engineer personnel should keep abreast of the condition of these tracks and advise the appropriate official as a routine maintenance check.

Outloading capability currently is limited more by a lack of blocking and bracing materials, small handtools, and trained personnel than by the physical attributes of the system. However, a current daily outloading capability of 36 railcars per 24-hour day is possible provided blocking and bracing materials can be obtained locally on short notice.

2. <u>Rail Outloading Analysis</u>

A complex system structure can be viewed as a series of interconnected subsystems. The limiting subsystem within the system establishes the maximum outloading capability. Therefore, in ascertaining the maximum rail outloading capability at Camp Shelby, the following subsystem separation was used:

a. <u>Commercial Service Capabilities</u>

Commercial service capabilities present no problem to Camp Shelby. The common carrier serving the post is the ICG, and its operations in the vicinity of Camp Shelby are well organized. Both the ICG and SR have large yards in Hattiesburg, that can be used for assembling and storing railcars. Since Hattiesburg is a rail center and only 12 miles distant, rail support for the operation should not be a major problem. The ICG has direct rail service to Gulfport, Mississippi (74 miles), Pascagoula, Mississippi (85 miles), and Mobile, Alabama (93 miles); the SR has direct service to New Orleans, Louisiana (117 miles), and indirect service to Mobile, Alabama. The ICG line to Mobile curre ly is being rebuilt completely, "under service," with all-welded rail.

b. <u>Moving to and Loading on Railcars at a Particular Site</u>

The movement of cargo to loading sites is relatively quick and efficient since most of the equipment is self-propelled and access is along good paved roads. Traffic patterns and traffic control would have to be set up, but such measures should be standard for full-scale outloading operations. Staging areas near the outloading sites are adequate, but railcars will block Lee Boulevard (the south gate will be closed

and the north gate should be used during the outloading operation). Recent field tests, during loading operations, revealed that vehicles move along the flatcars at an average speed of 1 mile per hour, with only one vehicle moving on a railcar at any one time. The longest string of empty flatcars used by the recommended outloading plan, assuming 57-foot car lengths (coupler to coupler), was 37 cars for the length of track L5. Using that figure, the first vehicle would reach the end of the last car 24 minutes after driving up the ramp; then blocking and bracing can be started. Loading time is insignificant in comparison with blocking and bracing time (table 3). Therefore, moving to and loading on the railcars is not the limiting subsystem.

c. Blocking, Bracing, and Safety Inspections

Blocking, bracing, and safety inspection times are difficult to project. They depend on a number of variables such as:

(1) Crew size and experience

(2) Extent of the safety inspection

(3) Documentation

(4) Availability of blocking and bracing material and materials-handling equipment (MHE)

During REFORGER 76, the establishment of a 5-1/2- to 7-hour time limit for loading, blocking, and bracing at a loading site, as a reasonable goal for crews, was based upon experience and actual field tests of circus-style loadings. In addition, discussions with the blocking and bracing instructors at Fort Eustis, Virginia, indicated that, to avoid wasted manhours, there should be no more than eight men per crew, regardless of experience.

At Camp Shelby, blocking and bracing materials and small handtools are not stocked. Stocks of these items should be arranged for to provide materials to outload the nonroadable equipment within the time specified by the contingency plan. Blocking and bracing crews should be trained on a periodic basis. Blocking and bracing is an immediate constraint; however, since the items can be obtained locally, it is only an immediate constraint.

TABLE 3

TIMES REQUIRED TO PERFORM VARIOUS LOADING FUNCTIONS

	Action	Type Vehicle or Item Being Loaded	How Loaded	Time Required Min-Sec	Considerations
Bilevels	Vehicles Driving on Bilevel Railcars (89-ft long)	Jeep	Own power	1'-00" per Railcar Length	Average of 5 timings
Bilevels	Vehicles Driving on Bilevel Railcars (89-ft long)	1-1/4-Ton Pickup	Own power	1'-03" per Railcar Length	Average of 6 timings
Bilevels	Vehicles Driving on Bilevel Railcars (89-ft long)	Gama Goat	Own power	1'-32" per Railcar Length	Average of 8 timings
Bilevels	Average Total Time to Load, Tiedown Vehicles on Bilevel Railcar, Complete	The three types above plus 3/4-ton trucks, mixed	Own power	34'-00" per Railcar	Average number of Bilevels loaded in string of cars - 15
TOFC's	Truck Tractor Backing Semitrailers on String of 89-ft TOFC Railcars	Semitrailers	Truck tractor	0'-42" per Railcar Length	Average number of TOFC cars in string --11, 2 trailers per car
TOFC's	Average Total Time to Load and Secure Semi-trailer to Hitch on TOFC Railcar	Semitrailers	Truck tractor	10'-00" per Semi-trailer	Average number of TOFC cars in string --11, 2 trailers per car
Flats	2-1/2-Ton Trucks Circus Loading on 60-ft flats	2-1/2-Ton Trucks	Own power	30"-45" per Railcar Length	Average of several timings
Flats	Total Time to Circus Load 11 60-ft Flats With 2-1/2-Ton Trucks, 2 per car (load only)	2-1/2-Ton Trucks	Own power	35'-00" per 11 60-ft Cars	
Forklift	Average Time for Rough Terrain Forklift Truck to Pick Standard-Size Containers (6-ft Wide, 8-ft Long, 5-ft High Approx) off Flatbed Truck, Transit 75 ft, and Load on Rail Flatcar.	Containers	Forklift	2'-12" per Container	Average of loading of 18 containers

d. Interchange of Empty and Loaded Railcars

An efficient interchange of empty and loaded railcars, which requires careful planning and good coordination with the common carrier, can be established at Camp Shelby since the ICG main line passes through the post.

The existence of two commercial railyards in Hattiesburg makes it possible to accumulate the number of empty cars required to maintain the operation. The various plans for spotting railcars depend on the type of operation. A place or location must be provided for railcars (1) in empty storage, (2) in loaded storage, and (3) at the loading sites. In general, three balanced or equally divided areas must exist somewhere in the vicinity. Since Camp Shelby's trackage is limited, the loading sites will double as loaded storage, and empty storage will be in Hattiesburg. Empty railcars destined for Camp Shelby should be accumulated and classified in Hattiesburg prior to being moved to Camp Shelby. Thus, if the interchange of railcars follows some semblance of the organization presented in the simulation (app B), the subsystem will not limit the capabilities of rail outloading operations at Camp Shelby.

e. Summary

Considering all the subsystems together, the shortage of blocking and bracing materials, bridgeplate supply, and small handtools emerges as the primary factor restraining any large rail outloading operations at Camp Shelby. Therefore, provision of these items is the major prerequisite for a successful operation. When these materials have been obtained, the resultant capability should be compared with movement contingency plans. The level of operation for outloading the nonroadable equipment in a 6-day period is approximately 110 railcars per day. Another aspect affecting station outloading at Camp Shelby is the destination of the unit material after it leaves the installation. Since Camp Shelby is within 117 miles of four POEs, only nonroadable equipment must be shipped by commercial carrier, and all roadable equipment should be driven to the port.

Although the Camp Shelby rail system and the common carrier servicing it have the potential for supporting the deployment of the nonroadable equipment in a timely manner, the

existence of capability at any one time will depend on how many of the supporting system deficiencies have been eliminated.

3. Rail System Outloading Options

The various options for outloading plans are shown in figure 24. Four plans for daylight-only loading were developed for the two balanced areas approach: Loading sites/loaded storage and empty storage, all of which are indicated in detail in the simulation, appendix B. Therefore, through proper planning, the main line locomotives can bring empties from Hattiesburg for the next cycle and pick up loaded cars for movement to the POE. The exact procedure for all switching operations, and the arrival and departure of main line locomotives is described in detail in the simulation for Plan 1, the recommended plan, in appendix B.

Four plans were developed to provide the following approximate daily outloading rates: 100, 125, 150, 200 railcars. All plans function similarly.

Plan 1 uses tracks L1, L2, L3, L4, and L5 to produce an output of 110 railcars per 24-hour day. This operation can be handled on post and at MacLaurin siding.

Plan 2 adds the proposed spur at Camp Shelby for a total output of 126 railcars per 24-hour day and would provide rail access to the commissary. This too, can be handled on post and at MacLaurin.

Plan 3, which produces an outloading rate of 151 railcars per 24-hour day, adds the siding at McCallum and the piggyback ramp and rip track 1 at the ICG Hattiesburg yard.

Plan 4 adds tracks 8, 10, 10A, and 13 at the SR Hattiesburg yard. This plan produces an outloading rate of 204 railcars per 24-hour day. Costs for all plans are shown in figure 24.

Arrangements should be made to delay incoming supplies that are to be shipped by rail during the outloading operation, if possible, or shipped by truck. If this is not possible, the railcars could be unloaded onto trucks at a siding in Hattiesburg and the supplies delivered to the post; or, if the items are not urgently needed, the railcars could be held until the operation is over.

Site	Track Location	Railcar Capacity 57-Ft Lengths Coupler to Coupler	Repair Costs	Daily[a] Mobilize 89 RCPD	Plan 1[b] 110 RCPD	Plan 2[b] 126 RCPD	Pl 1 R
1	Camp Shelby trackage[c] (includes one ICGRR spur)	59	19,225[d]	X	X	X	
2	Camp Shelby funded spur[e]	21		X	X	X	
3	Camp Shelby proposed spur[f]	16	61,000[g]			X	
4	ICG McLaurin siding[h]	30		X	X	X	
5	ICG McCallum siding[i]	12					
6	ICG Hattiesburg Yard[j] (piggyback ramp track) (rip track #1)	13					
7	Southern Railroad[k] Hattiesburg Yard (tracks 8, 10, 10A, and 13	53					
	Total Cost				$19,225	$80,225	$8
Portable end ramp made from available portable bridge spans, end sections				(1[l], 4)[k/m]	(1[l], 4)[k/m]	(1[l], 4)[k/m]	(1

Legend

X - Track is used for that option.
RCPD - Railcars per 24-hour day.

[a] Daily mobilization can be increased to 333 railcars of both nonroadable and roadable equipment by empl Railroad yards at Hattiesburg, Mississippi, for roadable equipment.

[b] Costs shown were provided by Camp Shelby facilities engineer.

[c] Camp Shelby present trackage consists of a west spur (capacity 18 cars), an east spur (capacity 32 car spur (capacity 9 cars). All Camp Shelby trackage requires maintenance.

[d] New end ramp--west spur $5,750; repair of Camp Shelby west and east spurs $13,475.

[e] Funded for FY 78 ($69,100 includes track and end ramp), provides easy access, with a concrete end-load tracked vehicles.

[f] Proposed track site has a semiprepared roadbed; with a small expenditure, this track could be put into ing retaining wall for end loading 16 flatcars with heavy tracked vehicles and a warehouse side-loadin

[g] Camp Shelby's proposed rail spur and gravel staging area.

[h] Good site for loading nonroadable heavy-tracked vehicles because of proximity to Camp Shelby (3 miles) no bridges. Will have to provide portable end ramp and gravel crossover.

[i] Good site for loading nonroadable heavy-tracked vehicles because of proximity to Camp Shelby (3 miles) long-span bridges.

[j] Piggyback facility has available end ramp. Will have to provide portable end ramp for rip track 1.

[k] Will have to provide portable end ramps at these sites (except at site 6, piggyback ramp track).

[l] Five portable steel end ramps are required at site 1, Camp Shelby trackage (includes one ICGRR spur).

[m] No costs shown for these available portable end ramps that can be improvised temporarily by using end bridge spans.

Figure 24. Camp Shelby and vicinity options.

Plan 2[b] 126 RCPD	Plan 3[b] 151 RCPD	Plan 4[b] 204 RCPD
X	X	X
X	X	X
X	X	X
X	X	X
	X	X
	X	X
		X
$80,225	$80,225	$80,225
(1[1], 4)[k/m]	(1[1], 4,5,6)[k/m]	(1[1],4,5,6,7)[k/m]

uipment by employing the ICG and Southern

(capacity 32 cars), and an ICG-owned center

ncrete end-loading ramp for loading heavy

uld be put into operation by using a natural exist-
ume side-loading platform to outload two boxcars.

helby (3 miles), along County Road and

helby (3 miles), along County Road and no

rip track 1.

p track).

e ICGRR spur).

y by using end sections of portable steel

PRACTICABLE

4. Physical Improvements and Additions

Items listed below are all minimum requirements to provide the recommended outloading rate of 110 railcars per 24-hour day, Plan 1, using existing trackage and the funded spur.

a. Upgrade the east and west spurs (L4 and L5) to federal track safety standard, class 2 (app A).

b. Encourage the ICG to maintain their on-post trackage.

c. Construct a permanent end-loading ramp for loading vehicles at the west spur (L4).

d. Determine the source and complete the arrangements for acquiring:

(1) Blocking and bracing materials for outloading the non-roadable equipment

(2) Bridgeplates for wheeled vehicles

(3) Small tools, including powersaws, cable cutters, wrecking bars, cable-tensioning devices, hammers, and so forth to permit operation of blocking and bracing crews at all outloading sites

5. Discussion of Time and Costs

a. Physical Improvements

The cost estimates used in this section were supplied by Camp Shelby facilities engineering personnel (app D). No times were given for projected completion dates on any improvements, but it should be noted that three brigades could be in a poor contingency situation at Camp Shelby for some time without the capability to move in an acceptable time frame. A 1-year target is recommended for completion of all work; figure 24 contains detailed cost figures.

b. Load Time Versus Equipment Type

Two basic types of outloading operations are mobilization and administrative. Mobilization moves are not artificial; since they only occur during national emergencies, there is genuine urgency. The most rapid method of loading and securing

mobile equipment on railcars is circus style. For example, if unit integrity is to be maintained, 2-1/2-ton trucks that are to pull trailers drive onto the string of railcars towing their trailers, and the equipment is secured in this configuration. This procedure is fast, but it wastes railcar space. During actual field tests on standard-type railcars, the loading, securing, and inspection of 2-1/2-ton trucks, two per railcar, site times varied from 5 hours for flatcars with chain tiedowns to 6-1/2 hours for flatcars without chain tiedowns, figure 25 and table 4. This was a fast efficient operation. Other similar operations that could occur in a mobilization-type move, for most Army units, include loading various sizes of containers onto standard-type flatcars by using forklifts. This operation, including loading and securing, and so forth, was accomplished in 5-1/2 hours. Site loading and securing times for semitrailers and vans on TOFC cars averaged 4 hours. All things considered, the circus-style loading operations indicate that, for mobilization moves, the loading, blocking and bracing, and inspections can be accomplished within 5-1/2 to 7 hours for most types of equipment.

Figure 25. Circus-style loading of 2-1/2-ton trucks, total loading, blocking and bracing, and inspection time, 5 hours.

However, if a unit has a significant number of small items, such as "mules," those items are likely to require 10 hours site time; this should be considered, rather than to assume that the work could be accomplished within 7 hours.

TABLE 4

TYPICAL SITE LOADING AND BLOCKING AND BRACING T

LEGEND

Type Railcar

B1 - Bilevel

TOFC - Trailer on flatcar

COFC - Container on Flatcar

DF - Flatcar/Integral Chain Tiedow

F - Standard-Type Flatcar

Type Railcar	Average Number Loaded (Range)	Type Load	How Loaded	Total Site Time Required (hrs) and Other Considerations	Details on Type Load
B1 89 ft	16 15-17	C	End, own power	7.5 All cars had chain tiedowns. Cars did not have bridge PL's, wooden PL's used	Typical Load: 50 jeeps, 15-3/4-ton 6-1¼ ton, 14 Gama Goats, each level number vehicles - 170
B1 89 ft	14½ 11-18	C	End, own power	10.7 All cars did not have chain tiedowns, used wooden bridge PL's.	Typical Load: 50 jeeps, 15-3/4-ton 6-1¼ ton, 14 Gama Goats, each level number vehicles - 170
TOFC 89 ft	12 10-12	C	End, backed on by tractor	4.0	Semitrailers - mostly MILVAN marri to form 40-ft semis. Some 20-ft se military vans on semis. Two per TO
DF 60 ft	11 9-14	C	End, own power	5.1 Chain tiedowns on all cars, wood wheel chocks, lateral wood blocking at wheels	All 2-1/2-ton trucks, various kinds per railcar.
F 54 ft	10	C	End, own power	6.5 Cable tiedowns made at site. Wheel chocks, lateral wheel blocking	All 2-1/2-ton trucks, various kinds per railcar.
F 54 ft	10 9-10	A	End, own power. Some forklift	10.0 Cable tiedowns made at site. Wood blocking as required.	1/4-ton trailers Wreckers Forklifts Mules, jeeps, CONEX containers
F 54 ft	9	A	Forklift, manpower	10.8 Cable tiedowns made at site. Wood blocking as required.	All 1/4-ton trailers or high percent of similar small items.
DF 60 ft	10 8-13	A	Rough terrain forklifts	8.3 Chain tiedowns on all cars. Wheel blocking used also	All two-wheeled trailers (various ty pulled by 2-1/2-ton trucks) 5 trailers/railcar
F 54 ft	9	A	Rough terrain forklifts	5.5 Cable tiedowns made at site. Blocking as required.	All containers - 5 cars with 8 containers each. 3 cars with 4 containers each. 1 car with 10 containers each.

RACING TIMES (TOTAL)

n Tiedowns	Type Load A - Administrative C - Circus S - Semitrailers	
pe Load	Manpower	Typical Problems
15-3/4-ton trucks, ach level, total	1½-2 men per vehicle	No bridge PL's on cars had to use wooden PL's. Man has to walk to front of vehicle as guide and to straighten bridge PL's. Delays if all vehicles not at site at loading time.
15-3/4-ton trucks, ach level, total	1½-2 men per vehicle	Same as above; and, missing tiedowns; cable tiedowns had to be fabricated and used. (Storm, rain not included in total time)
AN married together 20-ft semis and wo per TOFC car.	6-8 man crew	Some older cars have trailer hitches which have to be "pulled-up" into position by a cable attached to the tractor.
ous kinds, two	10 men per railcar	None
ous kinds, two	10 men per railcar	None
ners	10 men per railcar	Improper installation of tiedowns and blocking. Large number of small items, 1/4-ton trailer slow the installation of blocking since work has to proceed from one end of railcar to the other.
gh percentage	10 men per railcar	Improper installation of tiedowns and blocking. Large number of small items, 1/4-ton trailer slow the installation of blocking since work has to proceed from one end of railcar to the other.
various types)	10 men per railcar	None noted
ch. ch. ch.	10 men per railcar	None noted

For an administrative-type move, plenty of time exists for planning; night operations are not necessary except to finish work that is not completed during daylight hours and to switch railcars. This added flexibility helps to solve unforeseeable problems. The administrative-type move allows time for accumulating special-type railcars, such as bilevel autoracks and TOFC and COFC cars, which significantly reduce both labor and costs. For instance, small vehicles, jeeps, 3/4-ton trucks, 1-1/4-ton trucks, and gama goats can be loaded on bilevel cars (fig 26); semitrailers and vans can be loaded on TOFC cars; and MILVANs, for which there are no chassis, can be loaded on COFC cars. Mobile equipment, some 2-1/2-ton trucks, and all smaller vehicles can be loaded on bilevel railcars. These three types of specific railcars require no blocking and bracing, except that integral to the car.

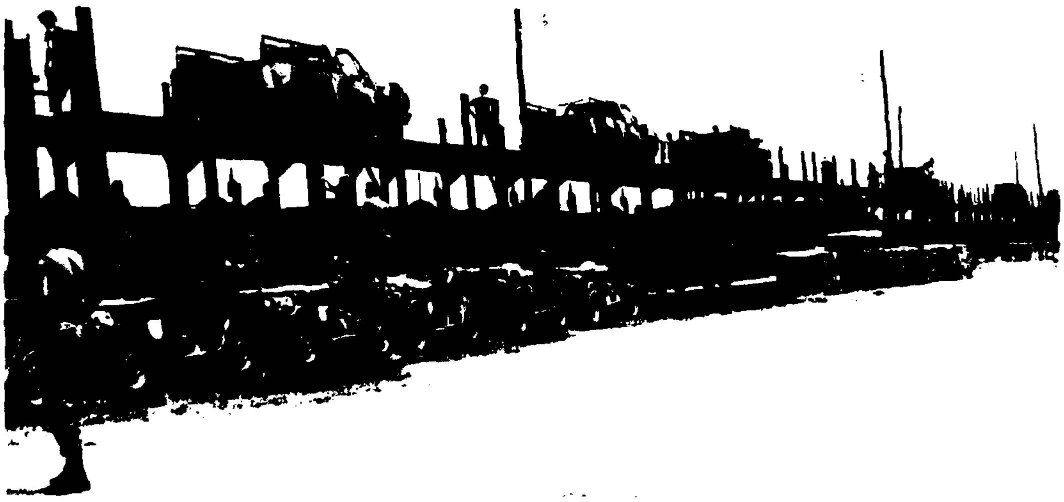


Figure 26. Lower level of bilevel cars loaded with jeeps, gama goats, 3/4-ton trucks, and 1-1/4-ton trucks.

Loading and securing times for bilevels varied from an average of 7-1/2 hours for a string of cars that were fully equipped with chain tiedowns, to 10-3/4 hours for those where cable tiedowns had to be fabricated to replace missing chain tiedowns. The average total time for TOFC cars was 4 hours. The administrative-type loads that require relatively longer times and more effort are illustrated in figures 27 and 28. This type of load required a total site time of 10 to 11 hours. In general, administrative-type operations should be planned for daylight hours, leaving night hours available for

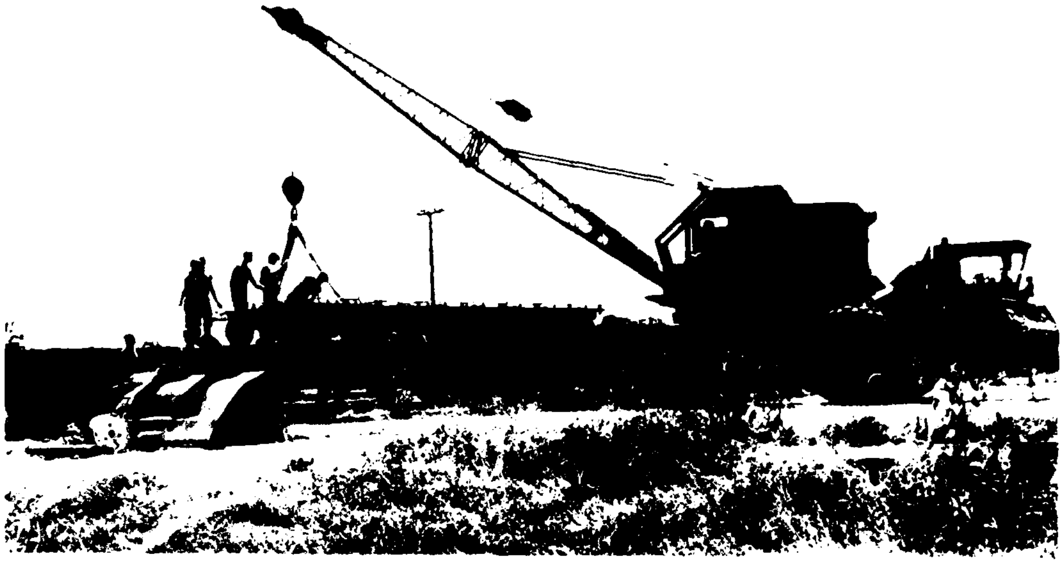


Figure 27. Administrative, load mules.

Figure 28. Administrative load, 1/4-ton trailers.

finishing up sites that started late or were slowed by problems and railcar switching. This type of planning allows enough flexibility to resolve problems and complete the operation on schedule. For mobilization-type moves, site time to load and secure equipment on a string of railcars should be accomplished in 5-1/2 to 7 hours; administrative-type moves, 4 to 11 hours. The time/motion studies conducted during the REFORGER 76 exercise resulted in the accumulation of valuable information for planning future station outloading operations and is included in tables 3 and 4. It should be

noted that loading times are relatively minor as compared with times required to secure the equipment. As an example, a jeep can drive across an 89-foot-long bilevel car in 1 minute, and a forklift truck can load a container in 2 minutes 12 seconds. So, loading times are not the problem. Also, as soon as the first vehicle is in position, several simultaneous operations are in effect--loading, blocking, and tieing down. Thus, for future planning, site times should be used; as a general rule, 5-1/2 to 7 hours for a mobilization move, and 4 to 11 hours for an administrative move. The 5-1/2-hour minimum for a mobilization move is used based on the assumption that only standard-type railcars are available. The 4-hour minimum for an administrative move carries the assumption that there is time to plan and assemble the type of railcars that are most appropriate for the equipment to be moved. The 4 hours, in this instance, was the average time required to load and secure semitrailers and vans on a string of twelve 89-foot-long TOFC cars.

To minimize the number of faulty or unacceptable loads that have to be done over, inspection of the loaded cars by the railroad should proceed simultaneously with the work.

c. <u>Transportation Equipment Costs--Bilevel Railcars Versus 54-Foot (Bed Length) Standard Flatcars</u>

A cost comparison, using nine different types of equipment scheduled for outloading in the REFORGER 77 exercise, revealed that $129,431 in transportation and materials (timber, cable, and so forth) could be saved by shipping the equipment on bilevel railcars rather than on standard-type, 54-foot flatcars. The equipment items vary from 1/4-ton trailers to 2-1/2-ton trucks. A total of 623 vehicles could be transported on 55 bilevel railcars. (See table 5 for details and app C for more information on special-purpose railcars.)

COST COMPARISON, BI

Column Number	1	2	3	4	5	6
Item No.	Vehicle Type	Model Number	Weight (lbs)	Height (in.)	Length (in.)	Quant to b Shipp
1	2-1/2-Ton Truck	M35A2	13,360	80.8	264.8	110
2	Gama Goat, 1-1/4-Ton	M561	7,480	71.9	231.1	27
3	M105A2 1-1/2-Ton Trailer	M105A2	2,670	82.0	166.0	113
4	1/4-Ton Trailer	M416	580	44.0	108.5	136
5	400-Gal Water Trailer	M149A1	2,530	80.6	161.4	20
6	1-1/4-Ton Truck	M880	4,695	73.5	218.5	11
7	3/4-Ton Trailer	M101	1,350	50.0	147.0	8
8	1/4-Ton Truck	M151	2,350	52.5	131.5	180
9	1-1/4-Ton Como Truck	M884	4,648	67.5	218.5	18
	Total					623

SUMMARY

Total cost to ship the 9 different items (623 vehicles) by 54-foot-long standard flat
Total cost to ship the 9 different items (623 vehicles) by 89-foot-long bilevel flatc
Savings in transportation costs if shipped by bilevel flats (Column 10-- Column 14)
Additional costs of blocking and bracing materials if shipped by 54-foot standard fla
Total savings if these nine items shipped by bilevel versus 54-foot flatcar

TABLE 5

EVELS VERSUS 54-FOOT FLATCARS

ty d	7 Quantity on 50-ft Railcar	8 Dollars	9 No. of 54-ft Cars Required	10 (8 x 9) Trans Cost for Item	11 Quantity on 89-ft Bilevel	12 Dollars	13 No. of Bilevels Required	14 (12 x 13) Trans Cost for Item
	2	2,413	55	132,715	6	7,238	18	130,284
	2	2,167	13	28,171	8	5,402	4	21,608
	3	2,167	37	80,179	12	3,612	9	32,508
	10	2,167	14	30,338	36	3,612	4	25,284
	4	2,167	5	10,835	12	3,612	2	7,224
	2	2,167	5	10,835	8	3,612	2	7,224
	4	2,167	2	4,334	12	3,612	1	3,612
	7	2,167	25	54,175	14	3,612	13	46,956
	2	2,167	9	19,503	8	3,612	2	4,334
				371,085			55	279,034

cars, Column 10	$371,085	
rs, Column 14	279,034	
	$ 92,051	
tcars	37,380	($60 x 623)
	$129,431	

III. ANALYSIS OF COMMERCIAL RAIL FACILITIES WITHIN 25 MILES OF CAMP SHELBY

A. GENERAL

All rail facilities within 25 miles of Camp Shelby were analyzed to determine the feasibility of their use during full-scale rail outloading operations at the installation. Factors considered in making the determination include:

1. Road access to the facility
2. Type of facility available - ramps and lighting
3. Equipment staging and queuing areas
4. Railcar storage and loading capacities
5. Track and facility maintenance conditions
6. Main line activity levels
7. Added expense of using commercial facilities
8. Security problems
9. Complication of splitting or relocating operations

B. FINDINGS

Several potential facilities were narrowed down to those that belonged to the main line railroads because they were the best. Track belonging to private concerns generally is not available and is unsuited for military rail outloading operations. Also, those facilities located more than a few miles from the post must have a significant capacity to make their use feasible. The main line representatives from the Illinois Central Gulf Railroad and the Southern Railroad assisted in determining rail capability. Findings of the study are summarized in table 6. Sites 1 through 4 are described in section II, "Analysis of Camp Shelby's Rail Outloading Facilities." A specific description of sites 5, 6, and 7 follows.

The ICG McCallum siding has an excellent potential for use because it is only 3 miles from Camp Shelby's tracked vehicle storage yard. This siding has a capacity of twelve 57-foot railcars and is on the

TABLE 6

RAILROAD FACILITIES WITHIN 25 MILES OF CAMP SHELBY

Location Site Number Figure	Road Distance From Camp Shelby (Miles)	Type of Trackage Available	Type of Ramps	Lighting	Surface Conditions	Staging Area	Storage Capacity (Railcars)	Ro[illegible]
ICC McCallum Siding Site 5 Figs 29 and 30	3	One siding, 60-lb rail	None	No	Natural, ground	Large, paved; Highway 89 graveled rest area	12	Good, gate siding insta of the and 2 the g
ICC Hattiesburg Yard Site 6	9.5							
Track 1		60-lb rail, end loading or classification, storage.	None	No	Graveled	None adjacent street or small vacant lot	7	Fair distr surfa
Track 3A			Piggyback	Some	Graveled		5	
Track 4			None	No	Graveled		26	
Rip track 1			None	No	Graveled		8	
Rip track 2			None	No	Graveled		7	
Figs 31 through 35								
Southern Railroad Yard Hattiesburg Site 7	13							
Spur 2		End loading and classification, storage	None	No	Graveled	Small and on surfaced streets	29	Fair t Hattie busin
Spur 3			None	No	Graveled		31	
Spur 4			None	No	Graveled		24	
Engine track			None	No	Graveled		10	
Pit track 8			None	No	Natural ground		7	
New house 10			None	No	Graveled		22	
Old house 10A			Concrete side ramp	No	Graveled		14	
South City			None	No	Graveled		48	
East track			None	No	Graveled		6	
Figs 36 through 40								
ICG Brooklyn Siding, 41	11	One siding 504 feet	None	No	Natural, ground	County road paralleling track	8	Fair - from c severa turall bridge
ICG Maxie Siding Figs 42 and 43	17	One siding 1,760 feet	None	No	Natural, ground	County road paralleling track	30	Fair - from g county severa turall bridge
ICG Wiggins	24.9							
Siding 1		Sidings	Side - 2 boxcars	No	Natural, ground	On surfaced streets	20	Poor, l street struct adequa to cro
Siding 2			None	No	Natural, ground		3	
Siding 3		Storage	None	No	Natural, ground		38	
Figs 44 and 45								
ICG New Augusta Siding Fig 46	9.6	Siding storage 60-lb rail	None	No	Natural ground	Paved Highway 89	13	Fair t distri surfac
Southern Railroad Moselle	22							
Spur		Siding spur	None	No	Part graveled	Small	10	Fair t distri surfac
Passing track		Storage	None	No	Part graveled	Small	55	
Fig 47								

Road Access to Site
Good, through north gate of Camp Shelby; siding is on the installation side of the main line and 200 yards from the gate.
Fair through rural district and off surfaced streets
Fair through Hattiesburg business district
Fair - 75 feet from county road several structurally inadequate bridges to cross
Fair - 75 feet from graveled county road several structurally inadequate bridges to cross
Poor, 100 feet from street; several structurally inadequate bridges to cross
Fair through rural district and off surfaced streets
Fair through rural district and off surfaced streets

installation side of the main line (figs 29 and 30). Highway 89 and a large rest area adjacent to the siding make an excellent hardstand for staging, queuing, and storage of work materials. The main line and siding are being repaired; however, the siding has 60-pound rail, so it will accommodate only light tracked vehicles. This facility is valuable because it is near the extremities of two on-post roads that end at the installation boundary, within 200 yards of the siding.

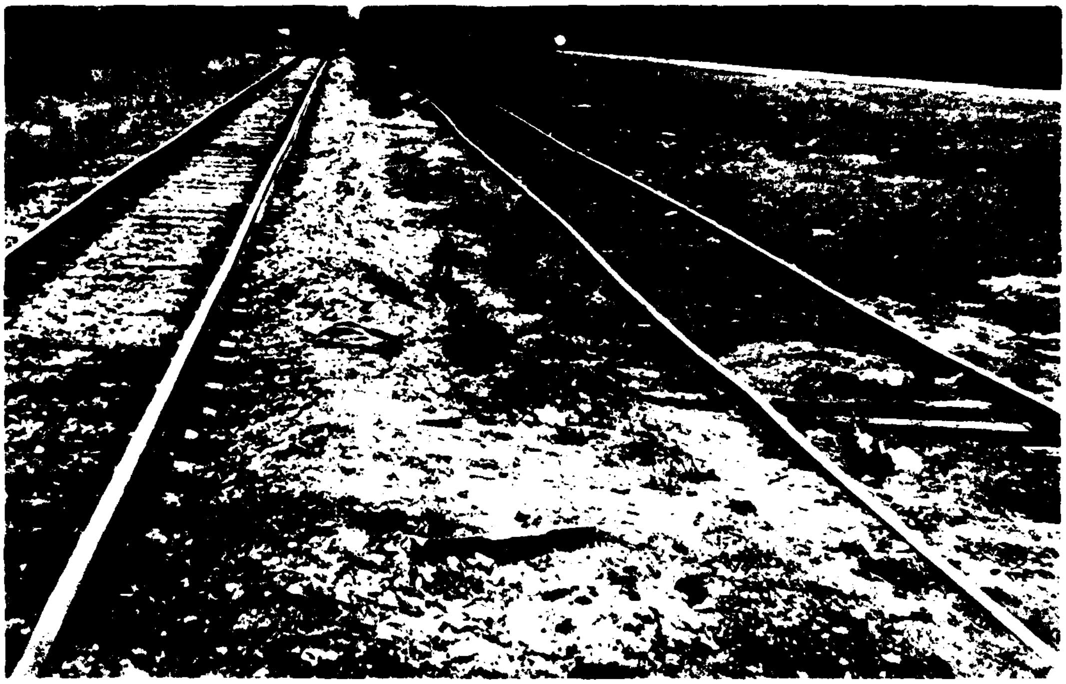


Figure 29. McCallum siding (looking east). (This siding is 6.15 miles from the ICG Hattiesburg yard. In the figure, the main line is on the left, and siding is on the right. The main line track is under reconstruction.)

Hattiesburg yard track 3A piggyback ramp and rip track 1 (figs 31 through 35), plus McCallum siding are considered excellent supplements. These are also used as an alternative for Plan 3 to outload 151 railcars per day. Track 3A, equipped with a piggyback ramp has a capacity of five 57-foot cars. There is some lighting over a small but adequate staging area. The rip track has a capacity of eight 57-foot railcars, but only light tracked vehicles should be loaded on the 60-pound rail. The surface along the track is gravel, and accessibility to the area is good. The end of the track butts up against the road; therefore, a portable end ramp is necessary. There is no

Figure 30. Camp Shelby north gate by road leading 2.6 miles to heavy tracked equipment area. (Gate is 200 yards from McCallum siding.)

lighting, and a narrow adjacent road would have to serve as the staging area.

The Southern Railroad Hattiesburg yard tracks 8, 10, 10A, and 13 (figs 36 through 40), plus those sites listed for Plan 3, (sites 1, 2, 3, 4, 5, and 6) complement Plan 4, as shown in figure 24. These facilities are considered adequate to outload 204 railcars per 24-hour day. However, with the SR yard in downtown Hattiesburg, possible complications could result if tracked vehicles were moved 9-1/2 miles over surfaced roads and bridges from Camp Shelby. The four tracks have a combined capacity of 53 railcars. Track 10A (old house) has a concrete side ramp that will accommodate two boxcars. Portable end ramps are required for all the tracks, and track 8 is designed for piggyback loading. A small staging area is adjacent to all the tracks. Surfaced streets, usable as a staging area, are within 100 feet of track 10A. All the tracks are in fair condition, but there is no lighting for these facilities. Track 8 has an adjacent natural ground surface; the other three tracks have gravel. These sites were selected because of their location, as well as their desirable outloading physical characteristics.

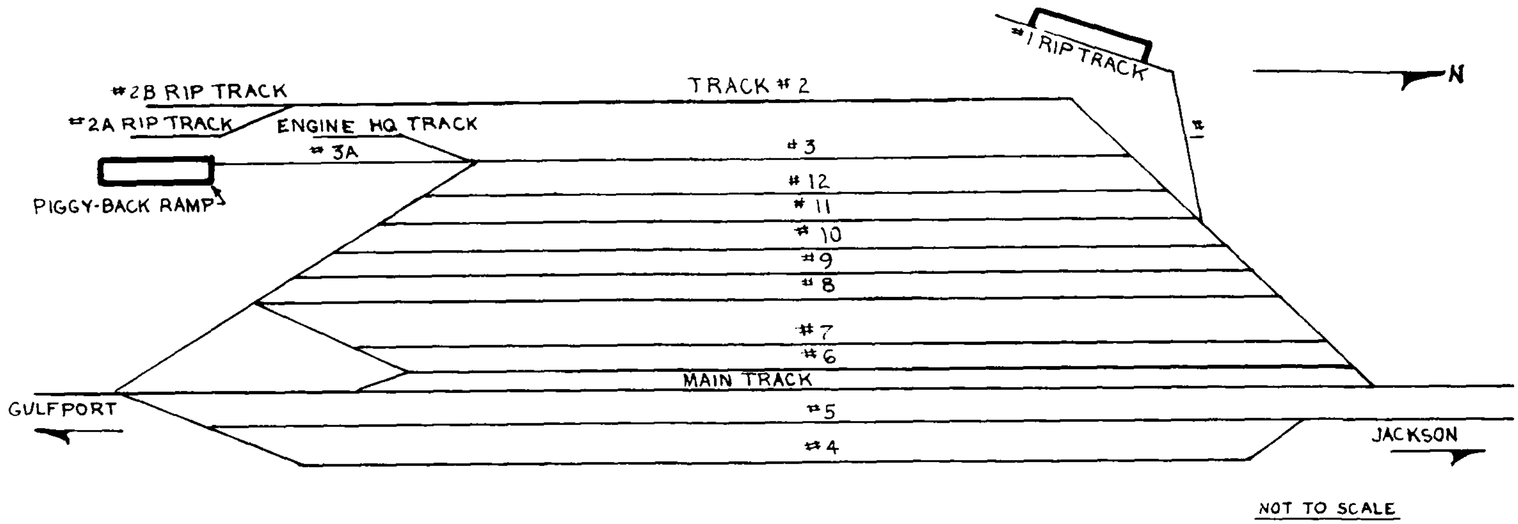


Figure 31. Illinois Central Gulf Railroad yard.

Figure 32. ICG Hattiesburg yard (looking north toward piggyback ramp, track 3A, and small graveled staging area).

Figure 33. ICG Hattiesburg yard track 4 (looking north). (Track 4, right side of figure, can be used for side and end loading with portable ramps. It has good accessibility from James Street. Vacant lots between track 4 and James Street can serve as staging areas.)

Figure 34. ICG Hattiesburg yard track 1 (looking south). (This track terminates at Roy Street. A portable ramp will have to be used at the end of the track to move equipment onto flatcars from the street that acts as a staging area.)

Figure 35. ICG Hattiesburg yard (looking north). (Rip track 1 on left, and rip track 2 on right. Portable end ramps will have to be used for both tracks. Staging area adjacent to road in foreground is small.)

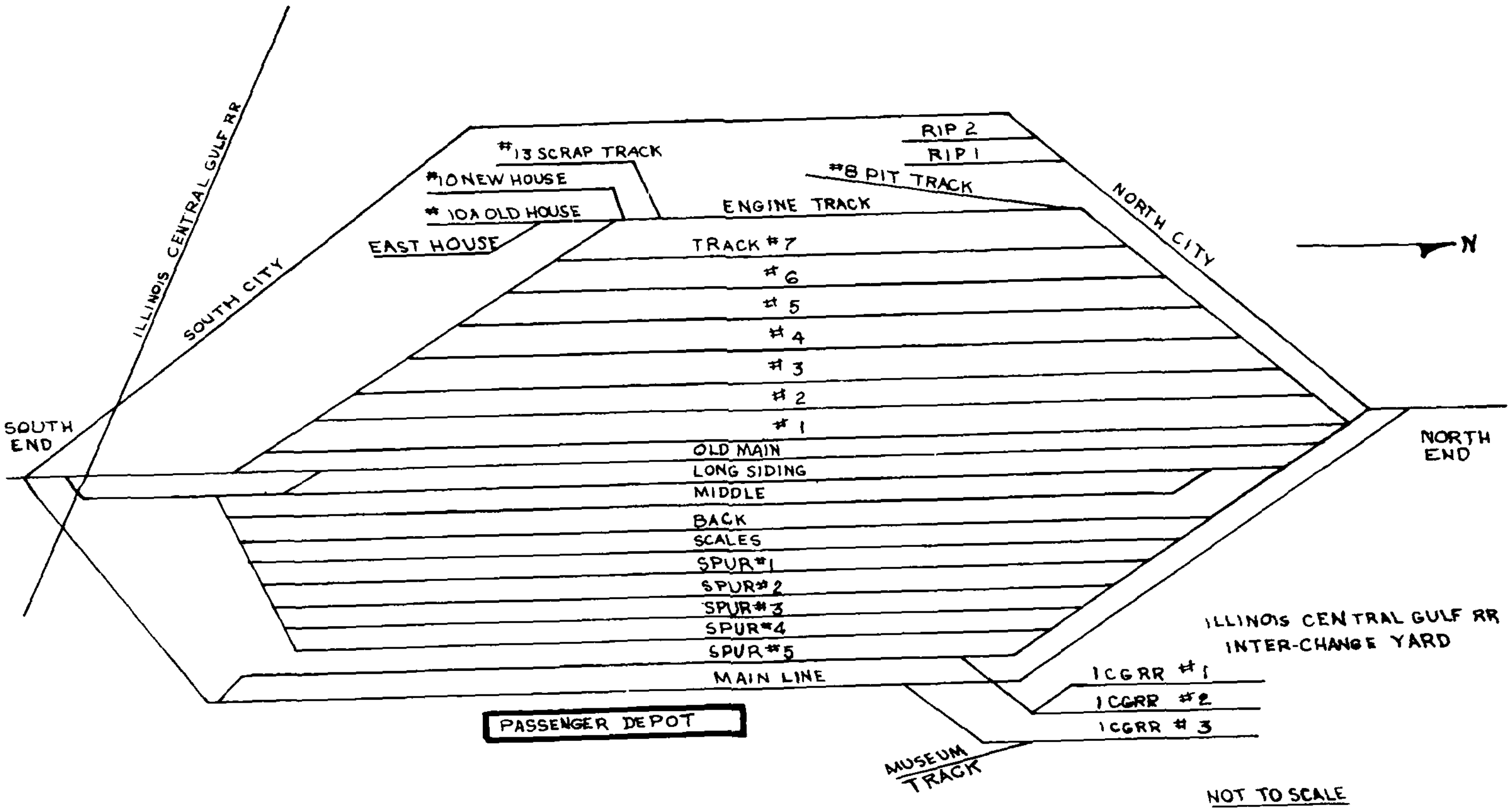


Figure 36. Southern Railroad System, Crescent Division.

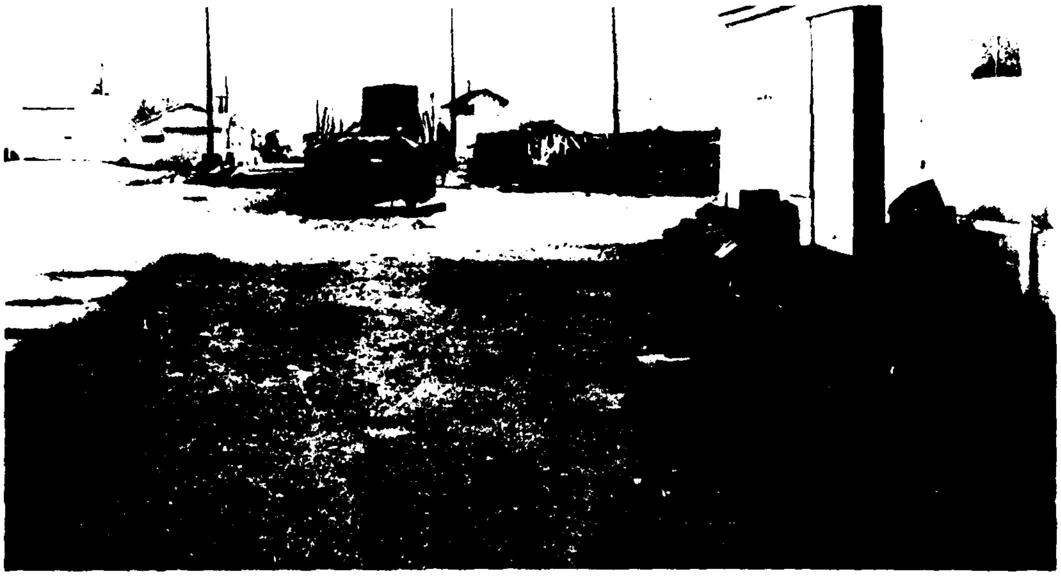


Figure 37. Southern Railroad Hattiesburg yard (looking south). (Track 8 (pit track), natural ground staging area, good for piggyback ramp loading.)

Figure 38. Southern Railroad Hattiesburg yard, tracks 7, 10, and 13 (looking south). (Track 7 on left, engine track in center, track 10 (new house track) on the right with boxcar, and track 13 (scrap track) on right with bumper.)

Figure 39. Southern Railroad Hattiesburg yard track 10A (looking south). (Track 10A (old house track) concrete side ramp for two boxcars, track is left of ramp.)

Figure 40. Southern Railroad Hattiesburg yard tracks 6, 7, and 10A (looking south). (Tracks 6 and 7 on left, engine track joining track 7 on left, and track 10A, old house track, on right.)

Five other sites surveyed are Brooklyn, Maxie, and Wiggins, south of the installation, on the IGG line (figs 41 through 45); and New Augusta,

Figure 41. Brooklyn siding (looking south). (Small staging area beside track with gravel and natural ground, access by adjacent road from Camp Shelby.)

Figure 42. Maxie siding (looking west). (Entrance to siding is from road paralleling ICG main line. The entrance is at the center of siding, necessitating the use of two ramps.)

Figure 43. Maxie siding (looking north). (Main line on left, siding on right. This site is 24. 9 miles from Camp Shelby.)

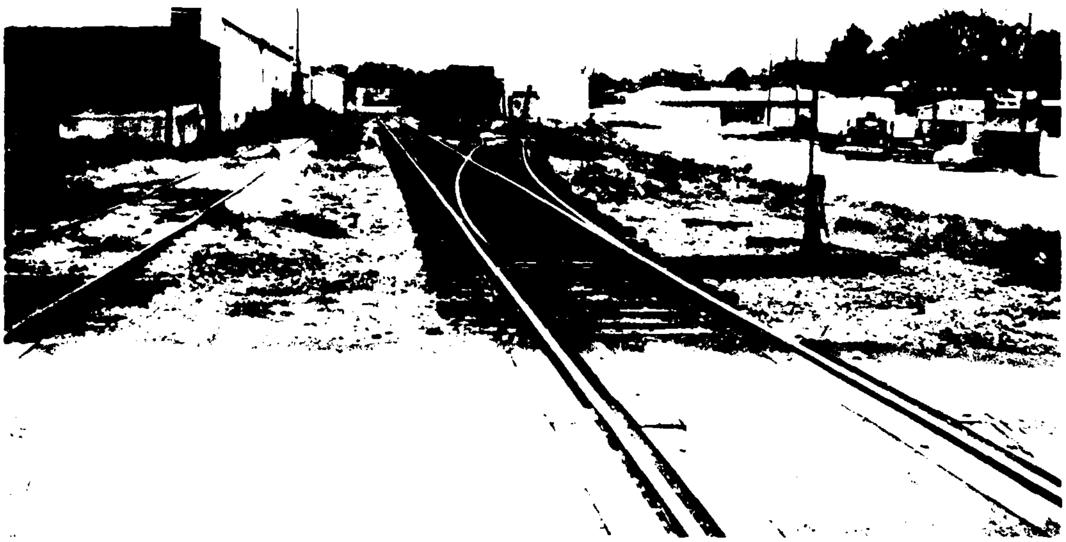


Figure 44. Wiggins siding (looking north to the right) and spur (to the left). (Natural earth surface condition, accessibility to the siding and spur is poor, and the staging area would have to be the surface of the street on the right in photo.)

Figure 45. Wiggins siding (looking south). (Wooden side ramp has room to load two boxcars. Staging area, Wiggins main street, on right.)

east of Hattiesburg (fig 46), and Moselle, north of Hattiesburg (fig 47), on the SR line. These sites, for the following reasons, were not considered as part of the outloading system.

None of the five sites can be reached conveniently by tracked vehicles; there are several bridge crossings along each route that are structurally inadequate for nonroadable heavy tracked equipment; they could be used for roadable equipment if required.

C. CONCLUSIONS REGARDING SELECTED RAIL FACILITIES

Camp Shelby facilities, plus the ICG McLaurin siding, the ICG McCallum siding, the ICG Hattiesburg yard, and the Southern Railroad Hattiesburg yard have excellent potential for fulfilling the equipment outloading requirement of Camp Shelby.

The ICG classification yard is adequate and should be used to store empty inbound railcars.

Trackage in the area is sufficient to support major outloading operations at Camp Shelby. Limited temporary loaded railcar storage capabilities exist on the ICG main line in the immediate area of Camp Shelby.

Figure 46. New Augusta siding (looking west). (The siding is to the right and main line to the left. Staging area, to the right of siding is small with a naturally grown surface condition. There is no end ramp nor lighting, and there is 60-pound rail siding.)

Figure 47. Moselle siding (looking north). (Southern Railroad main line is right, passing track is center, and spur is left in picture.)

The condition of facilities within 25 miles of Camp Shelby is fair, and the facilities are not convenient for loading nonroadable or heavy tracked equipment.

The location of facilities of the ICG and the SR suggests that, in the following order of precedence, the ICG Hattiesburg Yard and McCallum Siding and the SR Hattiesburg Yard be used only as a supplement for outloading roadable equipment. Also, that the existing Camp Shelby trackage, the Camp Shelby funded spur, the ICG spur at Shelby and McLaurin Siding be used for volume outloadings because of the proximity of these facilities for loading nonroadable heavy equipment.

IV. SPECIAL EQUIPMENT FOR EXPEDITING THE OUTLOADING OF MILVANS

A large supply of trailer-on-flatcar railcars is usually in the system, and container-on-flatcar railcars may be available. These cars should be used to transport semitrailers and MILVANs. If COFC or TOFC flatcars are not available, some blocking and bracing time and expense can be saved by using bulkhead flatcars for transporting MILVANs. See appendix C for additional information.

V. ANALYSIS OF MOTOR SYSTEM OUTLOADING CAPABILITY

A. GENERAL

The roadway system on the installation can accommodate the largest highway vehicles. Gate access to US 49, a dual highway, is by two at-grade interchanges, and the highway system in the area is adequate. Neither access to the highway system nor the system itself restrains motor outloading capability or movement of roadable military vehicles.

B. SEMITRAILER OUTLOADING

1. Procedure

The loading procedure could be as follows: A vehicle is driven up the ramp and onto the waiting semitrailer, temporary chocks are placed, the loaded truck is driven slowly away from the ramp to a designated location, and the loaded vehicle is secured with tiedown chains. The next semitrailer is backed up to the ramp, and the procedure is repeated. This procedure does not occupy the ramp while loaded vehicles are being secured. Using a conservative 60 minutes for each cycle, one semitrailer could be loaded per hour per ramp, or 10 vehicles per ramp per 10-hour shift. In most cases, 60 minutes would not be required.

2. Loading Ramps

A survey of motor pools and other facilities that might have end-loading ramps suitable for loading vehicles onto commercial semitrailers revealed 28 such ramps. Eight are fixed ramps located in motor pools (figs 48 and 49), and 20 are end sections from portable bridge spans, which could be used if not required for the rail operations (see figs 5 and 50).

3. Separate Operation

Using the 28 facilities for loading commercial semitrailers, at 60 minutes per cycle per ramp for a 10-hour workday, 280 loads would be produced.

It seems highly improbable that 280 semitrailers could be obtained on any day. Therefore, this operation is restrained not by the lack of facilities but by the available supply of semitrailers.

Figure 48. Two-position concrete end-loading ramp.

Figure 49. Fixed ramp in motor pool yard.

Figure 50. End section from portable bridge span.

Since Camp Shelby is approximately 100 miles distant from four POEs, semitrailer outloading is a significant consideration because commercial semitrailers could complete a round trip in about 4 hours.

C. VAN SEMITRAILER OUTLOADING

There are 30 positions at warehouses where vans could be loaded. Using a 2-1/2 hour cycle time per 10-hour workday for loading palletized cargo by forklift truck 120 vans could be loaded.

The boxcar load could be transported by van semitrailers.

VI. CONCLUSIONS

A. The condition of the three spur tracks at Camp Shelby is fair, maintenance required. Current rail outloading capability is limited by lack of necessary supporting elements, such as outloading plans, blocking and bracing materials, and small handtools. Potential outloading capability is large-scale, except for nonroadable equipment, due to an abundance of commercial facilities.

B. Because Camp Shelby is only 74 miles from Gulfport, Mississippi, only nonroadable equipment would have to be outloaded by rail. Necessary supplies should be stocked accordingly.

C. Estimated minimal cost for track rehabilitation and ramp construction to achieve an outloading rate of 110 railcars per 24-hour day is $19,225. Cost for needed blocking and bracing materials and small handtools is additional. After the noted deficiencies are corrected and on receipt of sufficient railcars to permit full-scale outloading operations, the three brigades' nonroadable equipment could be outloaded in 6 days.

D. Empty cars (dedicated train lengths) destined for Camp Shelby should be positioned, as in train-loading sequence, at Hattiesburg.

E. The ICG spur at Camp Shelby will be needed for a mobilization move; currently, this track needs maintenance.

F. Camp Shelby transportation personnel should coordinate planning of impending outloading operations with the ICG representatives at the earliest possible date.

G. For administrative-type moves, when leadtime is plentiful and costs must be considered, special-purpose railcars (such as bilevel autoracks, trailer-on-flatcar (TOFC), and container-on-flatcar (COFC) cars) are more cost-effective than the standard types and should be used to the extent they are available.

H. For mobilization moves, when time is more critical than costs, the use of special-purpose railcars may not be possible because of the short leadtime and relatively short supply of these high-demand cars.

I. Motor outloading facilities for loading commercial flatbed semitrailers and vans, which can accommodate 400 semitrailer loads during daylight hours for separate operations, far exceed the likely available supply of trailers.

J. Since Camp Shelby is about 74 miles from Gulfport, semitrailer outloading is a significant consideration because a commercial tractor-trailer could make the round trip in about 4 hours.

VII. RECOMMENDATIONS

A. Undertake those items listed in section II, paragraph D4, "Physical Improvements and Additions." These improvements will provide a rail system capability of 110 railcars per 24-hour day.

B. Prepare a detailed unit outloading plan, using the simulation in appendix B as an example, that specifies unit assignments at loadout sites and movement functions.

C. Coordinate rail outloading plans with the ICG representatives at the earliest possible date.

D. Provide rail facility maintenance to insure an effective rail system.

E. Provide advance training for blocking and bracing crews.

F. Station road guards at all railroad crossings during outloading operations to insure a safer and more efficient operation.

G. Keep abreast of the ICG plans for the spur at Camp Shelby and the siding at McLaurin, as these tracks are needed for the support of major outloading operations for nonroadable equipment.

H. Use special-purpose railcars (such as bilevel autoracks for small vehicles and TOFC cars for semitrailers and vans) for administrative-type moves and, as available, for mobilization moves.

APPENDIX A
TRACK SAFETY STANDARDS *

PART 213—TRACK SAFETY STANDARDS

AUTHORITY: The provisions of this Part 213 issued under sections 202 and 209, 84 Stat. 971, 975; 45 U.S.C. 431 and 438 and § 1.49(n) of the Regulations of the Office of the Secretary of Transportation; 49 CFR 1.49(n).

SOURCE: The provisions of this Part 213 appear at 36 F.R. 20336, Oct. 20, 1971, unless otherwise noted.

Subpart A—General

§ 213.1 Scope of part.

This part prescribes initial minimum safety requirements for railroad track

*Extracted from Title 49, Transportation, Parts 200 to 999, pp 8-19, Code of Federal Regulations, 1973.

that is part of the general railroad system of transportation. The requirements prescribed in this part apply to specific track conditions existing in isolation. Therefore, a combination of track conditions, none of which individually amounts to a deviation from the requirements in this part, may require remedial action to provide for safe operations over that track.

§ 213.3 Application.

(a) Except as provided in paragraphs (b) and (c) of this section, this part applies to all standard gage track in the general railroad system of transportation.

(b) This part does not apply to track—

(1) Located inside an installation which is not part of the general railroad system of transportation; or

(2) Used exclusively for rapid transit, commuter, or other short-haul passenger service in a metropolitan or suburban area.

(c) Until October 16, 1972, Subparts A, B, D (except § 213.109), E, and F of this part do not apply to track constructed or under construction before October 15, 1971. Until October 16, 1973, Subpart C and § 213.109 of Subpart D do not apply to track constructed or under construction before October 15, 1971.

§ 213.5 Responsibility of track owners.

(a) Any owner of track to which this part applies who knows or has notice that the track does not comply with the requirements of this part, shall—

(1) Bring the track into compliance; or

(2) Halt operations over that track.

(b) If an owner of track to which this part applies assigns responsibility for the track to another person (by lease or otherwise), any party to that assignment may petition the Federal Railroad Administrator to recognize the person to whom that responsibility is assigned for purposes of compliance with this part. Each petition must be in writing and include the following—

(1) The name and address of the track owner;

(2) The name and address of the person to whom responsibility is assigned (assignee);

(3) A statement of the exact relationship between the track owner and the assignee;

(4) A precise identification of the track;

(5) A statement as to the competence and ability of the assignee to carry out the duties of the track owner under this part; and

(6) A statement signed by the assignee acknowledging the assignment to him of responsibility for purposes of compliance with this part.

(c) If the Administrator is satisfied that the assignee is competent and able to carry out the duties and responsibilities of the track owner under this part, he may grant the petition subject to any conditions he deems necessary. If the Administrator grants a petition under this section, he shall so notify the owner and the assignee. After the Administrator grants a petition, he may hold the track owner or the assignee or both responsible for compliance with this part and subject to penalties under § 213.15.

§ 213.7 Designation of qualified persons to supervise certain renewals and inspect track.

(a) Each track owner to which this part applies shall designate qualified persons to supervise restorations and renewals of track under traffic conditions. Each person designated must have—

(1) At least—

(i) One year of supervisory experience in railroad track maintenance; or

(ii) A combination of supervisory experience in track maintenance and training from a course in track maintenance or from a college level educational program related to track maintenance;

(2) Demonstrated to the owner that he—

(i) Knows and understands the requirements of this part;

(ii) Can detect deviations from those requirements; and

(iii) Can prescribe appropriate remedial action to correct or safely compensate for those deviations; and

(3) Written authorization from the track owner to prescribe remedial actions to correct or safely compensate for deviations from the requirements in this part.

(b) Each track owner to which this part applies shall designate qualified persons to inspect track for defects. Each person designated must have—

(1) At least—

(i) One year of experience in railroad track inspection; or

(ii) A combination of experience in track inspection and training from a course in track inspection or from a college level educational program related to track inspection;

(2) Demonstrated to the owner that he—

(i) Knows and understands the requirements of this part;

(ii) Can detect deviations from those requirements; and

(iii) Can prescribe appropriate remedial action to correct or safely compensate for those deviations; and

(3) Written authorization from the track owner to prescribe remedial actions to correct or safely compensate for deviations from the requirements of this part, pending review by a qualified person designated under paragraph (a) of this section.

(c) With respect to designations under paragraphs (a) and (b) of this section, each track owner must maintain written records of—

(1) Each designation in effect;

(2) The basis for each designation, and

(3) Track inspections made by each designated qualified person as required by § 213.241.

These records must be kept available for inspection or copying by the Federal Railroad Administrator during regular business hours.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 875, Jan. 5, 1973]

§ 213.9 Classes of track: operating speed limits.

(a) Except as provided in paragraphs (b) and (c) of this section and §§ 213.57 (b), 213.59(a), 213.105, 213.113 (a) and (b), and 213.137 (b) and (c), the following maximum allowable operating speeds apply:

[In miles per hour]

Over track that meets all of the requirements prescribed in this part for—	The maximum allowable operating speed for freight trains is—	The maximum allowable operating speed for passenger trains is—
Class 1 track	10	15
Class 2 track	25	30
Class 3 track	40	60
Class 4 track	60	80
Class 5 track	80	90
Class 6 track	110	110

(b) If a segment of track does not meet all of the requirements for its intended class, it is reclassified to the next lowest class of track for which it does meet all of the requirements of this part. However, if it does not at least meet the requirements for class 1 track, no operations may be conducted over that segment except as provided in § 213.11.

(c) Maximum operating speed may not exceed 110 m.p.h. without prior approval of the Federal Railroad Administrator. Petitions for approval must be filed in the manner and contain the information required by § 211.11 of this chapter. Each petition must provide sufficient information concerning the performance characteristics of the track, signaling, grade crossing protection, trespasser control where appropriate, and equipment involved and also concerning maintenance and inspection practices and procedures to be followed, to establish that the proposed speed can be sustained in safety.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 875, Jan. 5, 1973; 38 FR 23405, Aug. 30, 1973]

§ 213.11 Restoration or renewal of track under traffic conditions.

If, during a period of restoration or renewal, track is under traffic conditions and does not meet all of the requirements prescribed in this part, the work and operations on the track must be under the continuous supervision of a person designated under § 213.7(a).

§ 213.13 Measuring track not under load.

When unloaded track is measured to determine compliance with requirements of this part, the amount of rail movement, if any, that occurs while the track is loaded must be added to the measurement of the unloaded track.

[38 FR 875, Jan. 5, 1973]

§ 213.15 Civil penalty.

(a) Any owner of track to which this part applies, or any person held by the Federal Railroad Administrator to be responsible under § 213.5(c), who violates any requirement prescribed in this part is subject to a civil penalty of at least $250 but not more than $2,500.

(b) For the purpose of this section, each day a violation persists shall be treated as a separate offense.

Exemptions.

(a) Any owner of track to which this part applies may petition the Federal Railroad Administrator for exemption from any or all requirements prescribed in this part.

(b) Each petition for exemption under this section must be filed in the manner and contain the information required by § 211.11 of this chapter.

(c) If the Administrator finds that an exemption is in the public interest and is consistent with railroad safety, he may grant the exemption subject to any conditions he deems necessary. Notice of each exemption granted is published in the FEDERAL REGISTER together with a statement of the reasons therefor.

Subpart B—Roadbed

§ 213.31 Scope.

This subpart prescribes minimum requirements for roadbed and areas immediately adjacent to roadbed.

§ 213.33 Drainage.

Each drainage or other water carrying facility under or immediately adjacent to the roadbed must be maintained and kept free of obstruction, to accommodate expected water flow for the area concerned.

§ 213.37 Vegetation.

Vegetation on railroad property which is on or immediately adjacent to roadbed must be controlled so that it does not—

(a) Become a fire hazard to track-carrying structures;

(b) Obstruct visibility of railroad signs and signals;

(c) Interfere with railroad employees performing normal trackside duties;

(d) Prevent proper functioning of signal and communication lines; or

(e) Prevent railroad employees from visually inspecting moving equipment from their normal duty stations.

Subpart C—Track Geometry

§ 213.51 Scope.

This subpart prescribes requirements for the gage, alinement, and surface of track, and the elevation of outer rails and speed limitations for curved track.

§ 213.53 Gage.

(a) Gage is measured between the heads of the rails at right angles to the rails in a plane five-eighths of an inch below the top of the rail head.

(b) Gage must be within the limits prescribed in the following table:

Class of track	The gage of tangent track must be—		The gage of curved track must be—	
	At least—	But not more than—	At least—	But not more than—
1	4′ 8″	4′ 9¾″	4′ 8″	4′ 9¾″
2 and 3	4′ 8″	4′ 9½″	4′ 8″	4′ 9¾″
4	4′ 8″	4′ 9¼″	4′ 8″	4′ 9½″
5	4′ 8″	4′ 9″	4′ 8″	4′ 9½″
6	4′ 8″	4′ 8¾″	4′ 8″	4′ 9″

§ 213.55 Alinement.

Alinement may not deviate from uniformity more than the amount prescribed in the following table:

Class of track	Tangent track	Curved track
	The deviation of the mid-offset from 62-foot line [1] may not be more than—	The deviation of the mid-ordinate from 62-foot chord [2] may not be more than—
1	5″	5″
2	3″	3″
3	1¾″	1¾″
4	1½″	1½″
5	¾″	⅝″
6	½″	⅜″

[1] The ends of the line must be at points on the gage side of the line rail, five eighths of an inch below the top of the railhead. Either rail may be used as the line rail, however, the same rail must be used for the full length of that tangential segment of track.

[2] The ends of the chord must be at points on the gage side of the outer rail, five-eighths of an inch below the top of the railhead.

§ 213.57 Curves; elevation and speed limitations.

(a) Except as provided in § 213.63, the outside rail of a curve may not be lower than the inside rail or have more than 6 inches of elevation.

(b) The maximum allowable operating speed for each curve is determined by the following formula:

$$V_{max} = \sqrt{\frac{E_a + 3}{0.0007d}}$$

where

V_{max} = Maximum allowable operating speed (miles per hour).

E_a = Actual elevation of the outside rail (inches).

d = Degree of curvature (degrees).

Appendix A is a table of maximum allowable operating speed computed in accordance with this formula for various elevations and degrees of curvature.

§ 213.59 Elevation of curved track; runoff.

(a) If a curve is elevated, the full elevation must be provided throughout the curve, unless physical conditions do not permit. If elevation runoff occurs in a curve, the actual minimum elevation must be used in computing the maximum allowable operating speed for that curve under § 213.57(b).

(b) Elevation runoff must be at a uniform rate, within the limits of track surface deviation prescribed in § 213.63, and it must extend at least the full length of the spirals. If physical conditions do not permit a spiral long enough to accommodate the minimum length of runoff, part of the runoff may be on tangent track.

§ 213.61 Curve data for Classes 4 through 6 track.

(a) Each owner of track to which this part applies shall maintain a record of each curve in its Classes 4 through 6 track. The record must contain the following information:

(1) Location;

(2) Degree of curvature;

(3) Designated elevation;

(4) Designated length of elevation runoff; and

(5) Maximum allowable operating speed.

[38 FR 875, Jan. 5, 1973]

§ 213.63 Track surface.

Each owner of the track to which this part applies shall maintain the surface of its track within the limits prescribed in the following table:

Track surface	Class of track					
	1	2	3	4	5	6
The runoff in any 31 feet of rail at the end of a raise may not be more than	3½"	3"	2"	1½"	1"	½"
The deviation from uniform profile on either rail at the midordinate of a 62-foot chord may not be more than	3"	2¾"	2¼"	2"	1¼"	½"
Deviation from designated elevation on spirals may not be more than	1¾"	1½"	1¼"	1"	¾"	½"
ariation in cross level on spirals in any 31 feet may not be more than	2"	1¾"	1¼"	1"	¾"	½"
Deviation from zero cross level at any point on tangent or from designated elevation on curves between spirals may not be more than	3"	2"	1¾"	1¼"	1"	½"
The difference in cross level between any two points less than 62 feet apart on tangents and curves between spirals may not be more than	3"	2"	1¾"	1¼"	1"	½"

Subpart D—Track Structure

§ 213.101 Scope.

This subpart prescribes minimum requirements for ballast, crossties, track assembly fittings, and the physical condition of rails.

§ 213.103 Ballast; general.

Unless it is otherwise structurally supported, all track must be supported by material which will—

(a) Transmit and distribute the load of the track and railroad rolling equipment to the subgrade;

(b) Restrain the track laterally, longitudinally, and vertically under dynamic loads imposed by railroad rolling equipment and thermal stress exerted by the rails;

(c) Provide adequate drainage for the track; and

(d) Maintain proper track cross-level, surface, and alinement.

§ 213.105 Ballast; disturbed track.

If track is disturbed, a person designated under § 213.7 shall examine the track to determine whether or not the ballast is sufficiently compacted to perform the functions described in § 213.103. If the person making the examination considers it to be necessary in the interest of safety, operating speed over the disturbed segment of track must be

reduced to a speed that he considers safe.

§ 213.109 Crossties.

(a) Crossties may be made of any material to which rails can be securely fastened. The material must be capable of holding the rails to gage within the limits prescribed in § 213.53(b) and distributing the load from the rails to the ballast section.

(b) A timber crosstie is considered to be defective when it is—

(1) Broken through;

(2) Split or otherwise impaired to the extent it will not hold spikes or will allow the ballast to work through;

(3) So deteriorated that the tie plate or base of rail can move laterally more than one-half inch relative to the crosstie;

(4) Cut by the tie plate through more than 40 percent of its thickness; or

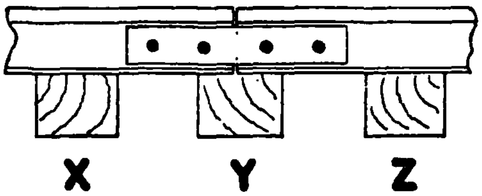
(5) Not spiked as required by § 213.127.

(c) If timber crossties are used, each 39 feet of track must be supported by nondefective ties as set forth in the following table:

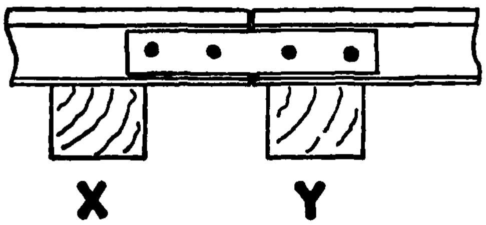
Class of track	Minimum number of nondefective ties per 39 feet of track	Maximum distance between nondefective ties (center to center) (inches)
1	5	100
2, 3	8	70
4, 5	12	48
6	14	48

(d) If timber ties are used, the minimum number of nondefective ties under a rail joint and their relative positions under the joint are described in the following chart. The letters in the chart correspond to letters underneath the ties for each type of joint depicted.

SUPPORTED JOINT



SUSPENDED JOINT



Class of track	Minimum number of nondefective ties under a joint	Required position of nondefective ties: Supported joint	Required position of nondefective ties: Suspended joint
1	1	X, Y, or Z	X or Y.
2, 3	1	Y	X or Y.
4, 5, 6	2	X and Y, or Y and Z.	X and Y.

(e) Except in an emergency or for a temporary installation of not more than 6-months duration, crossties may not be interlaced to take the place of switch ties.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 875, Jan. 5, 1973]

§ 213.113 Defective rails.

(a) When an owner of track to which this part applies learns, through inspection or otherwise, that a rail in that track contains any of the defects listed in the following table, a person designated under § 213.7 shall determine whether or not the track may continue in use. If he determines that the track may continue in use, operation over the defective rail is not permitted until—

(1) The rail is replaced; or

(2) The remedial action prescribed in the table is initiated:

REMEDIAL ACTION

Defect	Length of defect (inch): More than	Length of defect (inch): But not more than	Percent of railhead cross-sectional area weakened by defect: Less than	Percent of railhead cross-sectional area weakened by defect: But not less than	If defective rail is not replaced, take the remedial action prescribed in note—
Transverse fissure			20		B.
			100	20	B.
				100	A.
Compound fissure			20		B.
			100	20	B.
				100	A.
Detail fracture Engine burn fracture Defective weld			20		C.
			100	20	D.
				100	A, or E and H.
Horizontal split head Vertical split head	0	2			H and F.
	2	4			I and G.
	4				B.
	(Break out in railhead)				A.
Split web Piped rail Head web separation	0	½			H and F.
	½	3			I and G.
	3				B.
	(Break out in railhead)				A.
Bolt hole crack	0	½			H and F.
	½	1½			I and G.
	1½				B.
	(Break out in railhead)				A.
Broken base	0	6			E and I.
	6				(Replace rail).
Ordinary break					A or E.
Damaged rail					C.

NOTE:

A—Assign person designated under § 213.7 to visually supervise each operation over defective rail.
B—Limit operating speed to 10 m.p.h. over defective rail.
C—Apply joint bars bolted only through the outermost holes to defect within 20 days after it is determined to continue the track in use. In the case of classes 3 through 6 track, limit operating speed over defective rail to 30 m.p.h. until angle bars are applied; thereafter, limit speed to 50 m.p.h. or the maximum allowable speed under § 213.9 for the class of track concerned, whichever is lower.
D—Apply joint bars bolted only through the outermost holes to defect within 10 days after it is determined to continue the track in use. Limit operating speed over defective rail to 10 m.p.h. until angle bars are applied; thereafter, limit speed to 50 m.p.h. or the maximum allowable speed under § 213.9 for the class of track concerned, whichever is lower.
E—Apply joint bars to defect and bolt in accordance with § 213.121 (d) and (e).
F—Inspect rail 90 days after it is determined to continue the track in use.
G—Inspect rail 30 days after it is determined to continue the track in use.
H—Limit operating speed over defective rail to 50 m.p.h. or the maximum allowable speed under § 213.9 for the class of track concerned, whichever is lower.
I—Limit operating speed over defective rail to 30 m.p.h. or the maximum allowable speed under § 213.9 for the class of track concerned, whichever is lower.

(b) If a rail in classes 3 through 6 track or class 2 track on which passenger trains operate evidences any of the conditions listed in the following table, the remedial action prescribed in the table must be taken:

Condition	Remedial action: If a person designated under § 213.7 determines that condition requires rail to be replaced	Remedial action: If a person designated under § 213.7 determines that condition does not require rail to be replaced
Shelly spots Head checks Engine burn (but not fracture). Mill defect	Limit speed to 20 m.p.h. and schedule the rail for replacement.	Inspect the rail for internal defects at intervals of not more than every 12 months.
Flaking Slivered Corrugated Corroded	....do	Inspect the rail at intervals of not more than every 6 months.

(c) As used in this section—

(1) "Transverse Fissure" means a progressive crosswise fracture starting from a crystalline center or nucleus inside the head from which it spreads outward as a smooth, bright, or dark, round or oval surface substantially at a right angle to the length of the rail. The distinguishing features of a transverse fissure from other types of fractures or defects are the crystalline center or nucleus and the nearly smooth surface of the development which surrounds it.

(2) "Compound Fissure" means a progressive fracture originating in a horizontal split head which turns up or down in the head of the rail as a smooth, bright, or dark surface progressing until substantially at a right angle to the length of the rail. Compound fissures require examination of both faces of the fracture to locate the horizontal split head from which they originate.

(3) "Horizontal Split Head" means a horizontal progressive defect originating inside of the rail head, usually one-quarter inch or more below the running surface and progressing horizontally in all directions, and generally accompanied by a flat spot on the running surface. The defect appears as a crack lengthwise of the rail when it reaches the side of the rail head.

(4) "Vertical Split Head" means a vertical split through or near the middle of the head, and extending into or through it. A crack or rust streak may show under the head close to the web or pieces may be split off the side of the head.

(5) "Split Web" means a lengthwise crack along the side of the web and extending into or through it.

(6) "Piped Rail" means a vertical split in a rail, usually in the web, due to failure of the sides of the shrinkage cavity in the ingot to unite in rolling.

(7) "Broken Base" means any break in the base of a rail.

(8) "Detail Fracture" means a progressive fracture originating at or near the surface of the rail head. These fractures should not be confused with transverse fissures, compound fissures, or other defects which have internal origins. Detail fractures may arise from shelly spots, head checks, or flaking.

(9) "Engine Burn Fracture" means a progressive fracture originating in spots where driving wheels have slipped on top of the rail head. In developing downward they frequently resemble the compound or even transverse fissure with which they should not be confused or classified.

(10) "Ordinary Break" means a partial or complete break in which there is no sign of a fissure, and in which none of the other defects described in this paragraph are found.

(11) "Damaged rail" means any rail broken or injured by wrecks, broken, flat, or unbalanced wheels, slipping, or similar causes.

(12) "Shelly spots" means a condition where a thin (usually three-eighths inch in depth or less) shell-like piece of surface metal becomes separated from the parent metal in the railhead, generally at the gage corner. It may be evidenced by a black spot appearing on the railhead over the zone of separation or a piece of metal breaking out completely, leaving a shallow cavity in the railhead. In the case of a small shell there may be no surface evidence, the existence of the shell being apparent only after the rail is broken or sectioned.

(13) "Head checks" mean hair fine cracks which appear in the gage corner of the rail head, at any angle with the length of the rail. When not readil: visible the presence of the checks may often be detected by the raspy feeling of their sharp edges.

(14) "Flaking" means small shallow flakes of surface metal generally not more than one-quarter inch in length or width break out of the gage corner of the railhead.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 875, Jan. 5, 1973; 38 FR 1508, Jan. 15, 1973]

§ 213.115 Rail end mismatch.

Any mismatch of rails at joints may not be more than that prescribed by the following table:

Class of track	Any mismatch of rails at joints may not be more than the following—	
	On the trend of the rail ends (inch)	On the gage side of the rail ends (inch)
1	1/4	1/4
2	1/4	3/16
3	3/16	3/16
4, 5	1/8	1/8
6	1/8	1/8

§ 213.117 Rail end batter.

(a) Rail end batter is the depth of depression at one-half inch from the rail end. It is measured by placing an 18-inch straightedge on the tread on the rail end, without bridging the joint, and measuring the distance between the bottom of the straightedge and the top of the rail at one-half inch from the rail end.

(b) Rail end batter may not be more than that prescribed by the following table:

Class of track	*Rail end batter may not be more than— (inch)*
1	1/2
2	3/8
3	3/8
4	1/4
5	1/8
6	1/8

§ 213.119 Continuous welded rail.

(a) When continuous welded rail is being installed, it must be installed at, or adjusted for, a rail temperature range

that should not result in compressive or tensile forces that will produce lateral displacement of the track or pulling apart of rail ends or welds.

(b) After continuous welded rail has been installed it should not be disturbed at rail temperatures higher than its installation or adjusted installation temperature.

§ 213.121 Rail joints.

(a) Each rail joint, insulated joint, and compromise joint must be of the proper design and dimensions for the rail on which it is applied.

(b) If a joint bar on classes 3 through 6 track is cracked, broken, or because of wear allows vertical movement of either rail when all bolts are tight, it must be replaced.

(c) If a joint bar is cracked or broken between the middle two bolt holes it must be replaced.

(d) In the case of conventional jointed track, each rail must be bolted with at least two bolts at each joint in classes 2 through 6 track, and with at least one bolt in class 1 track.

(e) In the case of continuous welded rail track, each rail must be bolted with at least two bolts at each joint.

(f) Each joint bar must be held in position by track bolts tightened to allow the joint bar to firmly support the abutting rail ends and to allow longitudinal movement of the rail in the joint to accommodate expansion and contraction due to temperature variations. When out-of-face, no-slip, joint-to-rail contact exists by design, the requirements of this paragraph do not apply. Those locations are considered to be continuous welded rail track and must meet all the requirements for continuous welded rail track prescribed in this part.

(g) No rail or angle bar having a torch cut or burned bolt hole may be used in classes 3 through 6 track.

§ 213.123 Tie plates.

(a) In classes 3 through 6 track where timber crossties are in use there must be tie plates under the running rails on at least eight of any 10 consecutive ties.

(b) Tie plates having shoulders must be placed so that no part of the shoulder is under the base of the rail.

§ 213.125 Rail anchoring.

Longitudinal rail movement must be effectively controlled. If rail anchors which bear on the sides of ties are used for this purpose, they must be on the same side of the tie on both rails.

§ 213.127 Track spikes.

(a) When conventional track is used with timber ties and cut track spikes, the rails must be spiked to the ties with at least one line-holding spike on the gage side and one line-holding spike on the field side. The total number of track spikes per rail per tie, including plate-holding spikes, must be at least the number prescribed in the following table:

MINIMUM NUMBER OF TRACK SPIKES PER RAIL PER TIE, INCLUDING PLATE-HOLDING SPIKES

Class of track	Tangent track and curved track with not more than 2° of curvature	Curved track with more than 2° but not more than 4° of curvature	Curved track with more than 4° but not more than 6° of curvature	Curved track with more than 6° of curvature
1	2	2	2	2
2	2	2	2	3
3	2	2	2	3
4	2	2	3	----------
5	2	3	----------	----------
6	2	----------	----------	----------

(b) A tie that does not meet the requirements of paragraph (a) of this section is considered to be defective for the purposes of § 213.109(b).

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 876, Jan. 5, 1973]

§ 213.129 Track shims.

(a) If track does not meet the geometric standards in Subpart C of this part and working of ballast is not possible due to weather or other natural conditions, track shims may be installed to correct the deficiencies. If shims are used, they must be removed and the track resurfaced as soon as weather and other natural conditions permit.

(b) When shims are used they must be—

(1) At least the size of the tie plate;

(2) Inserted directly on top of the tie, beneath the rail and tie plate;

(3) Spiked directly to the tie with spikes which penetrate the tie at least 4 inches.

(c) When a rail is shimmed more than 1½ inches, it must be securely braced on at least every third tie for the full length of the shimming.

(d) When a rail is shimmed more than 2 inches a combination of shims and 2-

inch or 4-inch planks, as the case may be, must be used with the shims on top of the planks.

§ 213.131 **Planks used in shimming.**

(a) Planks used in shimming must be at least as wide as the tie plates, but in no case less than 5½ inches wide. Whenever possible they must extend the full length of the tie. If a plank is shorter than the tie, it must be at least 3 feet long and its outer end must be flush with the end of the tie.

(b) When planks are used in shimming on uneven ties, or if the two rails being shimmed heave unevenly, additional shims may be placed between the ties and planks under the rails to compensate for the unevenness.

(c) Planks must be nailed to the ties with at least four 8-inch wire spikes. Before spiking the rails or shim braces, planks must be bored with ⅝-inch holes.

§ 213.133 **Turnouts and track crossings generally.**

(a) In turnouts and track crossings, the fastenings must be intact and maintained so as to keep the components securely in place. Also, each switch, frog, and guard rail must be kept free of obstructions that may interfere with the passage of wheels.

(b) Classes 4 through 6 track must be equipped with rail anchors through and on each side of track crossings and turnouts, to restrain rail movement affecting the position of switch points and frogs.

(c) Each flangeway at turnouts and track crossings must be at least 1½ inches wide.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 876, Jan. 5, 1973]

§ 213.135 **Switches.**

(a) Each stock rail must be securely seated in switch plates, but care must be used to avoid canting the rail by overtightening the rail braces.

(b) Each switch point must fit its stock rail properly, with the switch stand in either of its closed positions to allow wheels to pass the switch point. Lateral and vertical movement of a stock rail in the switch plates or of a switch plate on a tie must not adversely affect the fit of the switch point to the stock rail.

(c) Each switch must be maintained so that the outer edge of the wheel tread cannot contact the gage side of the stock rail.

(d) The heel of each switch rail must be secure and the bolts in each heel must be kept tight.

(e) Each switch stand and connecting rod must be securely fastened and operable without excessive lost motion.

(f) Each throw lever must be maintained so that it cannot be operated with the lock or keeper in place.

(g) Each switch position indicator must be clearly visible at all times.

(h) Unusually chipped or worn switch points must be repaired or replaced. Metal flow must be removed to insure proper closure.

§ 213.137 **Frogs.**

(a) The flangeway depth measured from a plane across the wheel-bearing area of a frog on class 1 track may not be less than 1⅜ inches, or less than 1½ inches on classes 2 through 6 track.

(b) If a frog point is chipped, broken, or worn more than five-eighths inch down and 6 inches back, operating speed over that frog may not be more than 10 miles per hour.

(c) If the tread portion of a frog casting is worn down more than three-eighths inch below the original contour, operating speed over that frog may not be more than 10 miles per hour.

§ 213.139 **Spring rail frogs.**

(a) The outer edge of a wheel tread may not contact the gage side of a spring wing rail.

(b) The toe of each wing rail must be solidly tamped and fully and tightly bolted.

(c) Each frog with a bolt hole defect or head-web separation must be replaced.

(d) Each spring must have a tension sufficient to hold the wing rail against the point rail.

(e) The clearance between the hold-down housing and the horn may not be more than one-fourth of an inch.

§ 213.141 **Self-guarded frogs.**

(a) The raised guard on a self-guarded frog may not be worn more than three-eighths of an inch.

(b) If repairs are made to a self-guarded frog without removing it from service, the guarding face must be restored before rebuilding the point.

§ 213.143 Frog guard rails and guard faces; gage.

The guard check and guard face gages in frogs must be within the limits prescribed in the following table:

Class of track	Guard check gage: The distance between the gage line of a frog to the guard line [1] of its guard rail or guarding face, measured across the track at right angles to the gage line, [2] may not be less than—	Guard face gage: The distance between guard lines, [1] measured across the track at right angles to the gage line, [2] may not be more than—
1	4′ 6⅛″	4′ 5¼″
2	4′ 6¼″	4′ 5⅛″
3, 4	4′ 6⅜″	4′ 5⅛″
5, 6	4′ 6½″	4′ 5″

[1] A line along that side of the flangeway which is nearer to the center of the track and at the same elevation as the gage line.

[2] A line ⅝ inch below the top of the center line of the head of the running rail, or corresponding location of the tread portion of the track structure.

Subpart E—Track Appliances and Track-Related Devices

§ 213.201 Scope.

This subpart prescribes minimum requirements for certain track appliances and track-related devices.

§ 213.205 Derails.

(a) Each derail must be clearly visible. When in a locked position a derail must be free of any lost motion which would allow it to be operated without removing the lock.

(b) When the lever of a remotely controlled derail is operated and latched it must actuate the derail.

§ 213.207 Switch heaters.

The operation of a switch heater must not interfere with the proper operation of the switch or otherwise jeopardize the safety of railroad equipment.

Subpart F—Inspection

§ 213.231 Scope.

This subpart prescribes requirements for the frequency and manner of inspecting track to detect deviations from the standards prescribed in this part.

§ 213.233 Track inspections.

(a) All track must be inspected in accordance with the schedule prescribed in paragraph (c) of this section by a person designated under § 213.7.

(b) Each inspection must be made on foot or by riding over the track in a vehicle at a speed that allows the person making the inspection to visually inspect the track structure for compliance with this part. However, mechanical or electrical inspection devices approved by the Federal Railroad Administrator may be used to supplement visual inspection. If a vehicle is used for visual inspection, the speed of the vehicle may not be more than 5 miles per hour when passing over track crossings, highway crossings, or switches.

(c) Each track inspection must be made in accordance with the following schedule:

Class of track	Type of track	Required frequency
1, 2, 3	Main track and sidings.	*Weekly* with at least 3 calendar days interval between inspections, or *before use*, if the track is used less than once a week, or *twice weekly* with at least 1 calendar day interval between inspections, if the track carries passenger trains or more than 10 million gross tons of traffic during the preceding calendar year.
1, 2, 3	Other than main track and sidings.	*Monthly* with at least 20 calendar days interval between inspections.
4, 5, 6		*Twice weekly* with at least 1 calendar day interval between inspections.

(d) If the person making the inspection finds a deviation from the requirements of this part, he shall immediately initiate remedial action.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 876, Jan. 5, 1973]

§ 213.235 Switch and track crossing inspections.

(a) Except as provided in paragraph (b) of this section, each switch and track crossing must be inspected on foot at least monthly.

(b) In the case of track that is used less than once a month, each switch and track crossing must be inspected on foot before it is used.

§ 213.237 Inspection of rail.

(a) In addition to the track inspections required by § 213.233, at least once a

year a continuous search for internal defects must be made of all jointed and welded rails in Classes 4 through 6 track, and Class 3 track over which passenger trains operate. However, in the case of a new rail, if before installation or within 6 months thereafter it is inductively or ultrasonically inspected over its entire length and all defects are removed, the next continuous search for internal defects need not be made until 3 years after that inspection.

(b) Inspection equipment must be capable of detecting defects between joint bars, in the area enclosed by joint bars.

(c) Each defective rail must be marked with a highly visible marking on both sides of the web and base.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 876, Jan. 5, 1973]

§ 213.239 Special inspections.

In the event of fire, flood, severe storm, or other occurrence which might have damaged track structure, a special inspection must be made of the track involved as soon as possible after the occurrence.

§ 213.241 Inspection records.

(a) Each owner of track to which this part applies shall keep a record of each inspection required to be performed on that track under this subpart.

(b) Each record of an inspection under §§ 213.233 and 213.235 shall be prepared on the day the inspection is made and signed by the person making the inspection. Records must specify the track inspected, date of inspection, location and nature of any deviation from the requirements of this part, and the remedial action taken by the person making the inspection. The owner shall retain each record at its division headquarters for at least 1 year after the inspection covered by the record.

(c) Rail inspection records must specify the date of inspection, the location, and nature of any internal rail defects found, and the remedial action taken and the date thereof. The owner shall retain a rail inspection record for at least 2 years after the inspection and for 1 year after remedial action is taken.

(d) Each owner required to keep inspection records under this section shall make those records available for inspection and copying by the Federal Railroad Administrator.

Appendix A—Maximum Allowable Operating Speeds for Curved Track

Elevation of outer rail (inches)

Degree of Curvature	0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6
	Maximum allowable operating speed (mph)												
0°30′	93	100	107										
0°40′	80	87	93	98	103	109							
0°50′	72	78	83	88	93	97	101	106	110				
1°00′	66	71	76	80	85	89	93	96	100	104	107	110	
1°15′	59	63	68	72	76	79	83	86	89	93	96	99	101
1°30′	54	58	62	66	69	72	76	79	82	85	87	90	93
1°45′	50	54	57	61	64	67	70	73	76	78	81	83	86
2°00′	46	50	54	57	60	63	66	68	71	73	76	78	80
2°15′	44	47	50	54	56	59	62	64	67	69	71	74	76
2°30′	41	45	48	51	54	56	59	61	63	66	68	70	72
2°45′	40	43	46	48	51	54	56	58	60	62	65	66	68
3°00′	38	41	44	46	49	51	54	56	58	60	62	64	66
3°15′	36	39	42	45	47	49	51	54	56	57	59	61	63
3°30′	35	38	40	43	45	47	50	52	54	55	57	59	61
3°45′	34	37	39	41	44	46	48	50	52	54	55	57	59
4°00′	33	35	38	40	42	44	46	48	50	52	54	55	57
4°30′	31	33	36	38	40	42	44	45	47	49	50	52	54
5°00′	29	32	34	36	38	40	41	43	45	46	48	49	51
5°30′	28	30	32	34	36	38	40	41	43	44	46	47	48
6°00′	27	29	31	33	35	36	38	39	41	42	44	45	46
6°30′	26	28	30	31	33	35	36	38	39	41	42	43	45
7°00′	25	27	29	30	32	34	35	36	38	39	40	42	43
8°00′	23	25	27	28	30	31	33	34	35	37	38	39	40
9°00′	22	24	25	27	28	30	31	32	33	35	36	37	38
10°00′	21	22	24	25	27	28	29	31	32	33	34	35	36
11°00′	20	21	23	24	26	27	28	29	30	31	32	33	34
12°00′	19	20	22	23	24	26	27	28	29	30	31	32	3

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 876, Jan. 5, 1973]

APPENDIX B

PROPOSED RAIL OUTLOADING PROCEDURE FOR A MOBILIZATION MOVE AT CAMP SHELBY

Maximum rail outloading operations use a cyclic schedule to minimize conflicts and improve control. The recommended outloading plan, Plan 1, produces an output of 110 railcars per 24-hour day.

The simulation begins with the assumption that it takes several days to accumulate the necessary number of railcars to start full-scale outloading operations. The switching locomotives position the arriving railcars at the designated loadout sites, L1 through L5, according to a preconceived plan. Simultaneously, the equipment to be loaded aboard the cars is prepared and staged. Personnel should be used to act as road guards at all crossings to reduce delays and insure a safer operation.

The general plan of operation is that the loading sites, L1 through L5, receive and outload 110 railcars daily on a cyclic basis, from Camp Shelby and McLaurin siding. When the unit equipment is loaded on the railcars, the ICG switching engines will move them to the loaded storage track (S1), ICG main line on and south of Camp Shelby, where they will be coupled to the ICG main line (ML) road engines for movement south to Gulfport, Mississippi. When the ML road engines come to pick up the loaded cars, they will bring a string of 110 empty cars and 2 cabooses from the Hattiesburg yard.

The ICG switch engines will spot the empty cars at the appropriate track locations. There will be one incoming train of empties and two outgoing trains of loaded unit equipment per 24-hour period. Outgoing requires two ML locomotives for train 1 and three ML locomotives for outgoing train 2.

Loading, blocking, and bracing of the empty cars at the loading (L) tracks will be accomplished during daylight hours, and all switching operations will be carried out after blocking and bracing is finished and will continue until the cycle is completed.

Switching begins after all L tracks have loaded railcars that are ready to be moved (fig 51).

Initial conditions - railcars have been accumulated at the ICG and SR yards in Hattiesburg for several days. To expedite the operation and [illegible] minimum switching of cars at the loading sites, a train of 110 empty cars and 2 cabooses has been coupled from front to rear

ELAPSED TIME IN HOURS SINCE LOADING, BLOCKING AND BRACING BEGAN 7

TWO ICG RR MLS, ML1 & ML2 ARRIVE AT E1 WITH SL1, 110 EMPTY 57' RAILCARS AND 2 CABOOSES.	OPERATION		TR
	TIME (MINUTES)	[illegible]	[illegible]
	TRACK (LOCATION)	E1	[illegible]
	NUMBER OF RAILCARS	[illegible]	[illegible]

120 TON SL#1 WORKS ALONE	OPERATION
	TIME (MINUTES)
	TRACK (LOCATION)
	NUMBER OF RAILCARS

LEGEND	
C	COUPLE
UC	UNCOUPLE
TR	TRANSIT
L	LOADED
E	EMPTY
MN	MAIN
WT	WAIT
SB	SET BRAKES
TRK	TRACK
$\boxed{50}$	EMPTY RAILCARS
SL	SWITCHING LOCOMOTIVE
ML	MAIN LINE LOCOMOTIVE
FLT	FLATCAR

NOTE: SEE FIGURE 2 FOR SITE LOCATIONS

CAP 57' LG	PRIORITY OF USE	TRK NO	CAP CARS
	LOADING SITES:		
30	ICG RR McLAURIN SIDING	L1	30 FLT
9	CAMP SHELBY ICG CENTER SPUR	L2	9 FLT
21	CAMP SHELBY FUNDED SPUR	L3	21 FLT
18	CAMP SHELBY WEST SPUR	L4	7 FLT, 11 BOX
32	CAMP SHELBY EAST SPUR	L5	13 FLT, 19 BOX
	LOADED STORAGE SITES:		
110 2 CABOOSES	ICG RR MAIN LINE SOUTH OF CAMP SHELBY SWITCH	S1	0
	EMPTY STORAGE SITES:		
110 2 CABOOSES	ICG RR MAIN LINE NORTH OF CAMP SHELBY SWITCH	E1	0

$\boxed{113}$

ELAPSED TIME IN HOURS 7

Figure 51. Rail outloading simulation.

8 9

(ML1 & ML2)

	C-30-L (RB)	TR	C-17-L	ML'S #1 & #2 DEPART FOR GULFPORT → TR
	(30)	(30)	(7)	(118) (26 MPH)
	L1	S1	S1	GULFPORT
	30	30	47	47

UC-111-E UC SL#1

		TR	C-16-L (RB)	TR	SL#1		TR	C-16-L (RB)	TR	UC-16-L (SB)	TR	C-18-L (RB)	TR
...ES)	(2)	(2)	(16)	(11)	WT (19)	(2)	[illegible]	(16)	[illegible]	(16)	(6)	(18)	(6)
...TION)	E1	L5	L5	S1	S1	S1	L5	L5	S1	S1	L4	L4	S1
...AILCARS	1	1 (CABOOSE)	17	17	17	0	0	16	16	0	0	18	18

THREE SWITCH ENGINES ARRIVE FROM HATTIESBURG SL #2, #3 & #4	OPERATION	C-111-E	TR
	TIME (MINUTES)	(37)	(11)
	TRACK (LOCATION)	E1	L5
	NUMBER OF RAILCARS	111	111

0

0

6 0

17 47 0 16

111 0

8 9

10 11

ML S # [illegible] ARRIVE	UC-47-L(SB)	ML S1 & 2 PLUS ML #3	TR
AT GULFPORT	(47)	START BACK FROM POE	(75) 40 MPH
→	GULFPORT	→	S1
	0		0

C-5-L(RB)

-18-L (RB)	TR	UC-18-L(SB)	TR	C-9-L(RB)	TR		TR	UC-14-L(SB)	TR	C-6-L(RB)	TR	UC-16-L(SB)	SL # WAITS AT S 22 MIN
(18)	(6)	(18)	5	(9)	(8)	(5)	(6)	(14)	(6	(6)	(6)	(16)	FOR SL #3 & 4 TO BACK
L4	S1	S1	L2	L2	L3	L3	S1	5	L3	L5	S1	S1	OUT ONTO ML SO IT CAN
18	8	0	0	9	9	14	14	4	0	0	6	0	ENTER L3

	TR	UC-32-E (SB)	SL #2 #3 & #4	TR	UC-18-E (SB)	TR	UC-9-E-(SB)	TR	UC-21-E (SB)	TR
	(11)	(32)	WAIT 8	(22)	8	(6)	(9)	(10)	(21)	(5)
	L5	L5	MIN FOR	L4	L4	L2	L2	L3	L3	ML
	111	79	SL1 TO CLEAR ML	79	31	61	52	52	31	31

SL #2 RETURNS TO HATTIESBURG

SL #3 RETU[RNS] TO HATTIES[BURG]

0 [?]

6 0 [?]

5 [18]

[52]

34 48 64

0

10 11

12 13

	ARRIVE AT	C-65-L(RB)
	S1	(21)
	→	S1
		65

ML'S #1 #2 & #3 DEPART FOR GULFPORT WITH 64 LOADED CARS AND CABOOSE AT 1243. FIVE HOURS AND 43 MINUTES HAVE ELAPSED SINCE OUTLOADING WAS STARTED.

22MIN	TR
CK	(5)
T CAN	L3
	C

SL#1 RETURNS TO HATTIESBURG

C-UC-CABOOSE

TR	SL#4	TR		SL#4 WAITS 36MIN FOR	TR	UC-30-E (SB)
(5)	AT(5)	(5)	(3)	ML#1, #2 & #3 TO CLEAR	(12) (10MPH)	(30)
ML	FOR SL3	S1	S1	S1 THEN PROCEEDS	L1	L1
31	TO L3	31	30	TO L1.	30	0

TOTAL TIME TAKEN FROM FIRST SWITCHING OPERATION EQUALS 6 HOURS 27 MINUTES

#3 RETURNS TO HATTIESBURG

SL#4 RETURNS TO HATTIESBURG

30

11

65

12 13

in the following order at Hattiesburg: Two road locomotives (ML 1 and ML 2), caboose, switch engine SL 1, 13 boxcars, 7 flats, 6 boxcars, 6 flats, 11 boxcars, 37 flats, caboose, and 30 flats.

After the order of the empty cars is arranged, the train is pulled from Hattiesburg on the ICG main line to a point approximately 2,000 feet north of the Camp Shelby L5 switch, where the incoming railcars are spotted at E1, empty storage site.

At E1 the two road locomotives uncouple from the train and continue south on the main line until they pass the McLaurin siding L1 south switch; there they stop, reverse direction, and enter the siding, coupling to the 30 loaded flatcars. The road engines then pull the cars south off the siding onto the main line, push the 30 loaded cars north to a point about 5,500 feet south of the switch into L3 and stop.

Shortly after ML 1 and ML 2 start for L1, SL 1 uncouples from the empty car train and, pushing a caboose, picks up 16 cars from L5, and , as ML 1 and ML 2 have stopped, proceeds to couple the 16 cars and caboose to the 30 already in position.

SL 1 uncouples from the caboose and the ML 1 and ML 2 train departs for Gulfport 1 hour 25 minutes after switching was started.

SL 1 then starts to build up another Gulfport train at S1 loading site by going to L5 where it picks up the remaining 16 loaded cars and places them at S1.

While SL 1 is completing this switching operation, three switch engines, SL 2, SL 3, and SL 4, arrive at E1 from Hattiesburg to maneuver the 110 empties plus a caboose into loading sites L1, L2, L3, L4, L5, as they are vacated by SL 1 removing loaded cars and placing them at S1. Therefore, after SL #1 leaves L5 with the final 16 loaded cars, SL 2, SL 3, and SL 4 push the empty train onto L5 where it drops off and sets brakes on 13 boxcars, 7 flats, 6 boxcars, and 6 flats. There are now 79 empties remaining with the SL 2, SL 3, and SL 4 train. A total of 32 empty cars have been placed on L5. As the empty train restocks L5 with cars, SL 1, after delivering loaded cars to S1, returns to L4 where it couples to and pulls out 11 loaded boxcars and 7 flats, delivering the 18 cars to S1, where they are coupled to the other 16 loaded cars, making a total of 34 cars at S1.

SL 1 continues to empty loaded sites and returns to L2, picks up 9 flats, pulls them to L3 where it couples them onto an additional 5 loaded cars, pulls the 14 cars back onto the main line; from there they are pushed south until they couple with the 34 waiting cars at S1.

Instead of returning to their starting point at E1, SL 2, SL 3, and SL 4 wait 8 minutes for SL 1 to clear the main line on its tour to L3, and then go from L5 to L4 where it places 18 empty cars (7 flats and 11 boxcars), filling the railway vacancy quota for L4. It is at L4 that SL 2 is relieved of further switching operations and is sent back to Hattiesburg. There are only 61 empty cars left and SL 3 and SL 4 can handle the load.

Returning to the SL 1 operation, switch engine SL 1 has to return to L3 from S1 to remove the remaining 16 loaded flats that it delivers to S1; there it couples them to the Gulfport train making a total of 64 cars.

SL 1 waits at S1 22 minutes while SL 3 and SL 4 complete their switching operation by filling L2 and L3 with 9 and 21 empty cars, respectively. It is necessary at this point to maneuver SL 1 into a position north of the SL 3 and SL 4 empty car train so that it can return to Hattiesburg and also clear the main line track, allowing the other two switch engines to place the caboose onto the rear of the Gulfport train.

SL 3 and SL 4 have restocked L2 through L5 with empty cars; as they finish placing 21 cars on L3, both switch engines back north out onto the main line with the remaining 31 empty cars until the last car, a caboose, clears the L3 switch by 300 feet. At this point, SL 3, as it is no longer required. uncouples from the train and returns to Hattiesburg. SL 1, waiting at S1 after coupling 16 loaded cars from L5 to the southbound train, uncouples and returns to L3 siding, allowing SL 4 to proceed south on the main line and couple the caboose to the train. This completes a train of 65 loaded cars. As the SL 4 empty car train clears the L3 switch, SL 1 enters the main line north and returns to Hattiesburg.

SL 4 and the 30 remaining empty cars, slated for L1, uncouple from the caboose and wait 37 minutes at S1 until ML 1 and ML 2 return from Gulfport bringing an additional main line locomotive, ML 3, required to pull a 65-car loaded train.

The three main line engines arrive at S1 loading site where they take 21 minutes to couple and release brakes on the second stage Gulfport train of 65 cars. Departing for the port of embarkation at 1243, 5 hours 43 minutes have elapsed since outloading was started on 110 57-foot railcars.

When the Gulfport train heads south from S1 and clears the L1 site, SL 4 pushes the 30 remaining empties onto McLaurin siding, sets brakes, uncouples from the cars, then returns to Hattiesburg.

Total time used from the first switching operation until SL 4 starts its return to Hattiesburg is 6 hours 25 minutes.

The switching operations are made difficult since no siding exists at Camp Shelby, only spurs. In the simulation, several locomotives were used to speed the operation and it was accomplished rapidly; however, about 10 hours remain in the 24-hour period. Consequently, if obtaining locomotive power is a problem at the time of the move, the operation could still be accomplished within 24 hours, using fewer locomotives, by extending the switching time. For instance, delivery of the empties could be delayed several hours and the total operation could still be completed within a 24-hour period.

The operational times and locomotive capabilities used in preparing the simulation are shown in table 7.

TABLE 7
TIMES REQUIRED FOR VARIOUS RAILCAR SWITCHING OPERATIONS AND LOCOMOTIVE CAPABILITY

Empty

C-15-E (5 min)
C-30-E (10 min)
C-45-E (15 min)
UC-15-E (1-2 min)
UC-15-E (SB) (15 min)
UC-30-E (SB) (30 min)

SB = Set Brakes
Set brakes if cars are to be left over night or loaded or on a steep grade.
RB = Release Brakes

Loaded

C-15-L (5 min)
C-30-L (10 min)
C-45-L (15 min)
But if cars have been sitting overnight brakes must be checked
C-15-L (RB) (15 min)
C-30-L (RB) (30 min) (or 15 min for 2 men)
C-45-L (RB) (45 min) (or 15 min for 3 men)
UC-15-L (1-2 min)
UC-15-L (SB) (15 min)
UC-30-L (SB) (30 min)

Note:
Above times are for daylight operations add 5 minutes for night if brakes have to be set or checked.

TRANSIT SPEED

Average for all switching operations; 5 miles per hour up to 3,000 feet, then 10 miles per hour. Engine with no railcars, 10 miles per hour for distance of one-half mile or more, except for nighttime; then add 5 minutes for each transit.

LOCOMOTIVE CAPABILITY

120-ton locomotive-- 1200 tons on 2.5% grade
Empties--34 cars
Loaded--24 cars
2 M-60 tanks on series 38 car, 9 cars per locomotive
16 cars per locomotive with 1 tank per car
2 locomotives--2 times above capabilities

Speed vs Time

@5 miles per hour, time in minutes = .00227 min/ft (distance in feet)
@10 miles per hour, time in minutes = .00114 min/ft (distance in feet)
@26 miles per hour, time in minutes = .000438 min/ft (distance in feet)

APPENDIX C

SPECIAL-PURPOSE RAILCARS AND LOADING/UNLOADING PROCEDURES

Specially designed railcars, in particular those used for transporting vehicles, can greatly increase the speed and efficiency of a rail outloading operation. Bilevel, trilevel, and integral chain tiedown flatcars are the primary means of enhancing the loadout routine of most military vehicles. Bilevel and trilevel railcars are best suited for the smaller vehicles, including 2-1/2-ton trucks.

The integral tiedown flatcars will accommodate larger vehicles, including tanks. Loading and securing equipment on these railcars can be accelerated to 15 minutes per vehicle, for small vehicles, versus approximately 45 minutes for blocking and bracing procedures used on standard-type railcars. Also, the BTTX 89-foot flatcar has a capacity of six 2-1/2-ton trucks, doubling the single level capacity. Thus, in speed and capacity, special-purpose railcars are an advantage worth investigating.

There are essentially five methods of loading/unloading multilevel railcars, they are:

1. The "K" loader of 463L aircraft cargo-loading system.
2. The forklift and pallet used in conjunction with a crane and/or ramp.
3. The crane and ramp combination.
4. Adjustable ramps.
5. Adjustable built-in ramp on multilevel railcars.

The procedures used with each of the above are described in detail in TM 55-625[2/], as are tiedown procedures.

As of 1970, more than 70 percent of DOD installations had no organic capability to load/unload multilevel railcars. No outloading plans should include the use of these railcars until a thorough investigation verifies

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[2/] TM 55-625, Transportability Criteria and Guidanee, Loading and Unloading Multilevel Railcars at Military Installations in the United States.

their availability at the time required. The supply of special-purpose flatcars with integral tiedowns is also limited. As a result, even though these types of railcars are very valuable for volume rail outloading operations, their availability is seriously in question unless advance preparations are made.

The following trends in flatcar supply are now operative and have been since the development of modern piggyback service in the mid-1950's:

1. The size of the flatcar fleet has been growing, both in number of flatcars and in relation to the size of the car fleet as a whole. This gain has been confined to specialized cars; for example, trailer-on-flatcar, container-on-flatcar, bilevel, trilevel, and bulkhead flatcars.

2. The size of the general-purpose flatcar fleet has decreased, though average length and capacity have increased.

3. A majority of all flatcars are owned by car companies, not by the railroads. Therefore, more flexibility in assignment, with improved utilization, has resulted. Fewer idle cars available for short-nctice use than would be if each railroad maintained an adequate supply for its own needs.

Considering these trends, the sizes of the various components of the specialized flatcar fleet, and the blocking and bracing requirements for the various types of equipment to be shipped by rail, it does not appear prudent to express an installation's needs and outloading plan using only general-purpose flats. The TOFC fleet, in particular, is now most likely large enough to fill military requirements (table 8). The COFC fleet also has expanded to the point that it could carry most of the military's container movements, especially since COFC cars are used almost exclusively for import/export movements, which likely would be greatly disrupted in a mobilization period.

Accordingly, vans or containers should be outloaded on TOFC cars. If the movement is to a port for ocean shipment by other than RORO vessel, the use of COFC cars should be considered. However, the availability of COFC cars in the quantity desired without disrupting civilian container movements is highly improbable.

Other cars in the specialized flatcar fleet generally are assigned to specific services or to a carpool for one shipper's exclusive use. Therefore, although these cars can save blocking and bracing and should be requested when they can be employed profitably in a specific move, the likelihood of obtaining the cars is too weak to base outloading requirement on their use.

TABLE 8
TRAILER TRAIN COMPANY FLEET

Trailer Train Company ownership of selected car types as contained in the April 1976 Official Railway Equipment Register. Trailer Train owns in excess of 95 percent of total US ownership of TOFC, COFC, and autorack cars.

Type	Reporting Marks	Quantity
TOFC	*TTX	29,661
	TTAX	5,033 (see also COFC cars)
	GTTX	2,287
	LTTX	1,876
	XTTX	733
	Total	39,590

Each car has a capacity of two 40-foot (nominal length) trailers. Some can handle one 40-foot and one 45-foot trailer. The XTTX cars also have the capability of transporting three 28-foot trailers.

Type	Reporting Marks	Quantity
COFC	TTAX	5,033 (see also TOFC cars)
	TTCX	708
	Total	5,741

Each car can handle four 20-foot container equivalents. Note that the TTAX cars can handle either containers or trailers and so are counted in both TOFC and COFC totals.

Type	Reporting Marks	Quantity
Bilevels	TTBX	4,333
	BTTX	2,776
	Total	7,109
Trilevels	TTKX	6,133
	RTTX	3,500
	KTTX	2,685
	TTRX	2,196
	ETTX	796
	Total	15,310

*Definitions of Trailer Train Company reporting marks (all are flatcars)

TTX - Equipped with hitches and bridge plates for the transportation of trailers.
TTAX - Equipped with movable foldaway container pedestals, knockdown hitches and bridge plates for transporting trailers or containers or combinations of both. (A = all).
GTTX - Equipped with hitches and bridge plates for the transportation of trailers built by General American Transportation Corporation. (G = general)
LTTX - Low deck (2' 8" or 2' 9" instead of 3' 6"), equipped with hitches and bridge plates. (L = low)
XTTX - Equipped with four hitches and bridge plates for the transportation of two trailers; one 45-foot and one 40-foot or three 28-foot trailers.
TTCX - Equipped with movable foldaway container pedestals for transporting containers. (C = container)
BTTX - Equipped with bilevel autoracks furnished by member railroads. (B = bilevel)
TTBX - Length 89' 4" or over, equipped with bilevel autoracks furnished by member railroads. (B = bilevel)
TTKX - Length 89' 4" or over, equipped with hinged-end trilevel autoracks furnished by member railroads.
RTTX - Length 89' 4" or over, equipped with fixed trilevel autoracks furnished by member railroads.
KTTX - Equipped with hinged-end trilevel autoracks furnished by member railroads.
TTRX - Equipped with fixed trilevel autoracks furnished by member railroads.
ETTX - Equipped with fully enclosed trilevel autoracks furnished by member railroads. (E = enclosed).

Factors affecting the use of specialized flatcars include:

1. First priority for use of general-purpose flats should be to load tracked vehicles and nonstandard wheeled vehicles; for example, artillery.

2. First priority for requesting specialized flats should be for TOFC and COFC cars to load vans and containers, which require very extensive blocking and bracing to move on general-purpose cars.

3. TOFC and COFC cars require no blocking and bracing.

4. Bilevel and trilevel flats will require heavier chains and possibly different hooks to handle other than commercial specification vehicles.

5. Chain tiedown flats may require heavier chains, depending on the loads for which they were designed.

6. Where TOFC cars must be loaded using a ramp rather than side or overhead loading, the number of cars at a ramp should be limited to about 10 because of the delay involved in backing the trailers down the length of the cars and returning with the tractor.

7. Where sufficient suitable aprons and MHE are available, it may be desirable to load containers directly onto COFC cars rather than to place them on bogies and use TOFC cars.

8. If COFC or TOFC cars are not available, some blocking and bracing time and expense can be saved by using bulkhead flatcars to carry containers.

9. Bilevel and trilevel cars require, obviously, bilevel and trilevel ramps or other equipment as indicated in TM 55-625.

10. TOFC, COFC, bilevel, and trilevel cars average 89 feet long. TOFC cars can handle two 40-foot trailers or one 40-foot and one 45-foot trailer. COFC cars can handle four 20-foot container equivalents. Autorack cars can accommodate four to seven vehicles per deck, depending on vehicle length and the number of tiedown chain sets.

11. Tracks used to store or load cars over 65 feet long should be reachable without going through curves exceeding 10-degree curvature, and tracks used for cars between 55 and 65 feet should be reachable without going through curves exceeding 12-degree curvature.

APPENDIX D

CONSTRUCTION COST ESTIMATE

CAMP SHELBY, MISSISSIPPI

Annual Training Site
Route 6
Hattiesburg, Miss. 39401

601 - 582-2364
Autovon 437-1690

17 January 1978

SUBJECT: Cost Estimate for Repairs and Additions to Camp Shelby Rail Spurs

Military Traffic Management Command
ATTN: Transportation Engineering (Mr. Grier)
P O Box 6276
Newport News, VA 23606

The enclosed cost estimate is provided per your request.

FOR THE TRAINING SITE SUPERVISOR:

1 Incl
Cost Estimate

SIDNEY E. KILLEBREW
Lt Col, AUS (Ret)
Facilities Engineer

AD-A101 760 MILITARY TRAFFIC MANAGEMENT COMMAND TRANSPORTATION EN--ETC F/G 15/5
RAIL AND MOTOR OUTLOADING CAPABILITY STUDY, CAMP SHELBY, MISSIS--ETC(U)
MAY 78 J H GRIER, N J MACLEOD
UNCLASSIFIED MTMC-TE-78-15 SBIE-AD-E750 088 NL

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A101 760

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DATE
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RAIL SPUR REPAIRS AND ADDITIONS
CAMP SHELBY, MS

17 January 1978

1.	**West Spur Repairs**			
a.	Replace bad ties	115 ea @$25	=	$ 2,875.00
b.	Minor leveling and tamping	650 LF @$ 4	=	2,600.00
c.	Replace Rails	40 LF @$10	=	400.00
		Sub-Total	=	$ 5,875.00
2.	**East Spur Repairs**			
a.	Replace bad ties	120 ea @$25	=	$ 3,000.00
b.	Ballast, leveling, tamping	800 LF @$ 5	=	4,000.00
c.	Replace Rails	60 LF @$10	=	600.00
		Sub-Total	=	$ 7,600.00
3.	**Replace End Ramp on West Spur**			
a.	Demolition and Removal of old ramp		=	$ 750.00
b.	Construction of new ramp		=	5,000.00
		Sub-Total	=	$ 5,750.00
4.	**Construction of New Spur with End Ramp**			
a.	Pavement demolition and grade work	1,000 LF @$ 5	=	$ 5,000.00
b.	Frog, Switch, etc.		=	5,000.00
c.	Grade Crossings	2 ea @$3,000	=	6,000.00
d.	Ballast, ties and rails	1,000 LF @$40	=	40,000.00
e.	Construction of End Ramp		=	5,000.00
		Sub-Total		$61,000.00
		Grand Total	=	$80,225.00

DISTRIBUTION

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